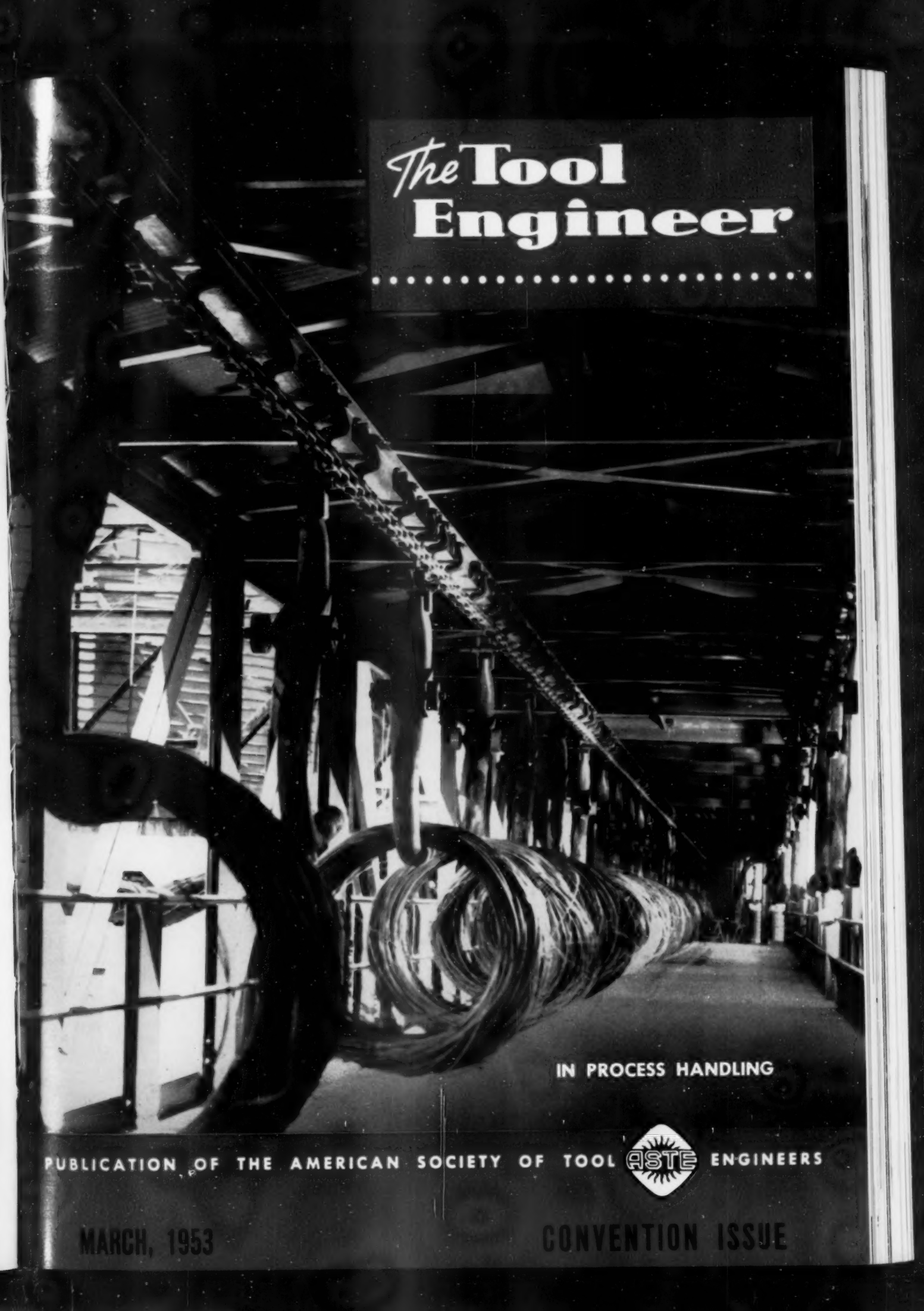


The Tool Engineer

IN PROCESS HANDLING

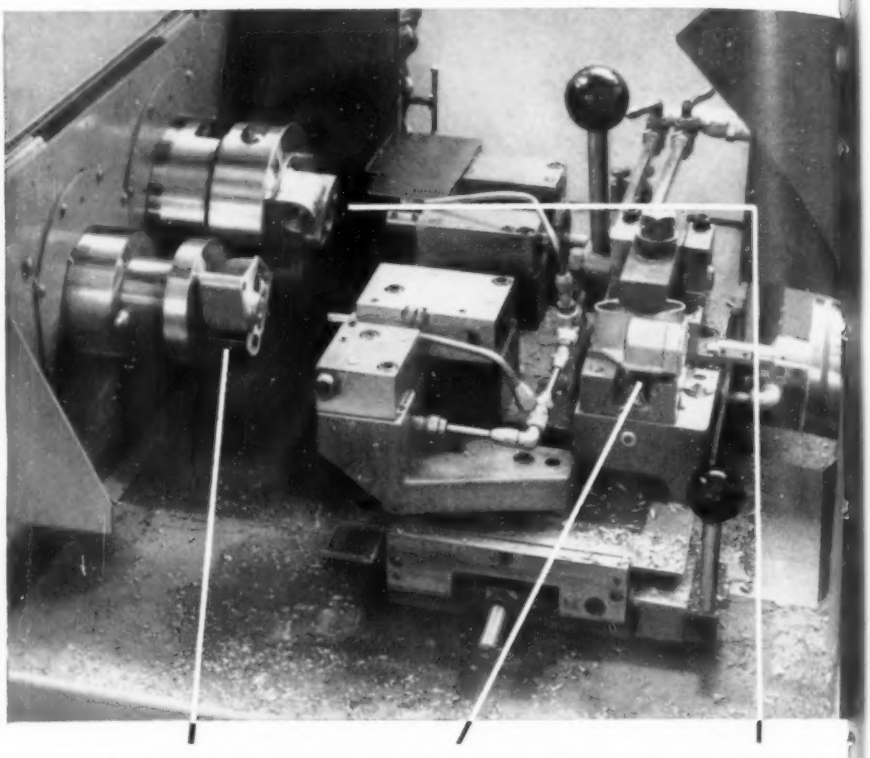
PUBLICATION OF THE AMERICAN SOCIETY OF TOOL ENGINEERS

MARCH, 1953 CONVENTION ISSUE

PROGRESSIVE BORIZING

speeds precision finishing of complex, multi-surface work

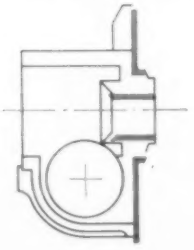
Heald Model 221 Bore-Matic finishes 9 different surfaces in 3 sequential operations



Here, in effect, are three machines in one — a single, versatile Heald Bore-Matic with three different fixture stations each having its own workholding and tooling features. The parts — precision instrument housings — are bored, faced and turned on 9 different surfaces in three consecutive operations. The machine cycle is fully automatic. The first and third operations are performed simultaneously on the left hand end of the machine; the second operation is performed on right end.

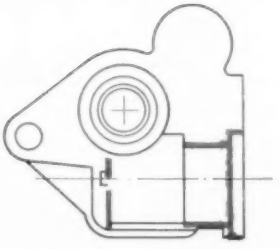
This is another typical example of the extreme versatility of Heald Bore-Matics — permitting highly specialized operations on a basically standard machine. Remember — when it comes to precision finishing, it pays to come to Heald.

1st OPERATION



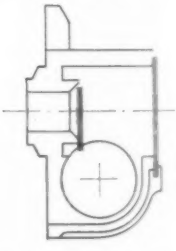
Rotating stake fixture holds the part on the left front station. Tooling on cross slide performs the boring, turning and facing operations indicated above.

2nd OPERATION



Part is clamped on platen type fixture on cross slide. Rotating tools on right-hand boringhead perform the two boring and two facing operations indicated.

3rd OPERATION



Rotating finger fixture on left rear boringhead holds work. Tooling mounted on cross slide performs the final two facing operations as indicated above.

HEALD

Case Study
No. 2230-96 in
PRECISION PRODUCTION

INTERNAL AND ROTARY SURFACE GRINDING MACHINES AND BORE-MATICS

THE HEALD MACHINE COMPANY

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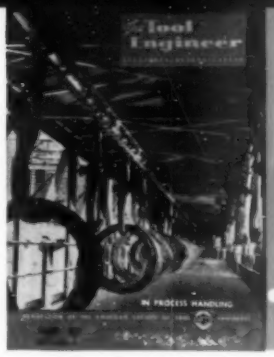
Branch Offices: Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York

Cover: Coils of wire are being carried by this conveyor from a coiling station in a wire mill to a succeeding building for redrawing.



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THE TOOL ENGINEER is regularly indexed in *The Industrial Arts Index.*

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Publication of The American Society of Tool Engineers
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The Tool Engineer

Increasing Production

Theme of the 21st Annual meeting in Detroit and of this issue of THE TOOL ENGINEER is increasing production and reducing costs. The know-how for accomplishing such production achievements has characterized our engineers and is distinctly American. Yet the surface has only been scratched insofar as methods are concerned for achieving these goals.

Machine tools—whether standard, modified or special—generally produce 50 percent more work than was possible 20 years ago. This has resulted from increased capacity, shorter cycles and general improvements. Where production requirements have justified the development of special machines, even more phenomenal results have been obtained. There seems to be no limit to their possibilities. A spectacular production method today may be obsolete tomorrow. A case involving military production may serve as an illustration. Recently, tooling had been developed to perform operations on a part in less than four hours. Formerly, the same operation required sixteen hours. Now a machine is being built which is expected to produce the same part in five minutes.

Great strides have also been made in automation, eliminating much of the time-consuming and costly in-process handling. Today, most automation engineers are concerned with the automatic handling of parts between machine tools. Soon these same experts may be equally concerned with automatic assembly and automatic inspection. It has been said that as much capital investment should be made in assembly machines and automation as is currently being made in machine tools. On standard lines and for military production, that may not be in the too distant future.

Greater strides in improving production methods will be realized through objective studies and by interchange of information and data between plants. In competitive production of civilian goods there may be some valid arguments against such practices but, where military production is concerned, anything else would be sabotage.

John W Greve

EDITOR

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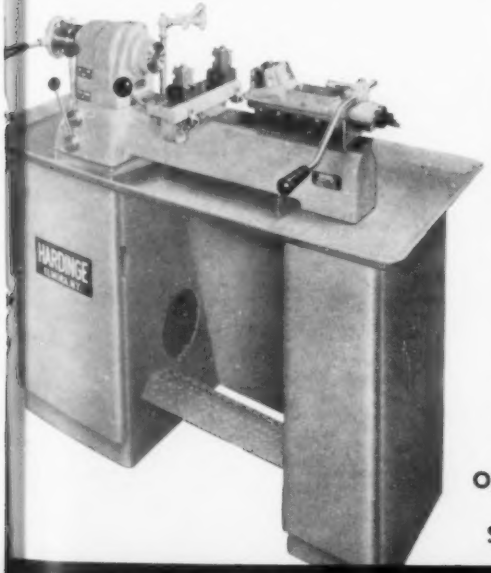

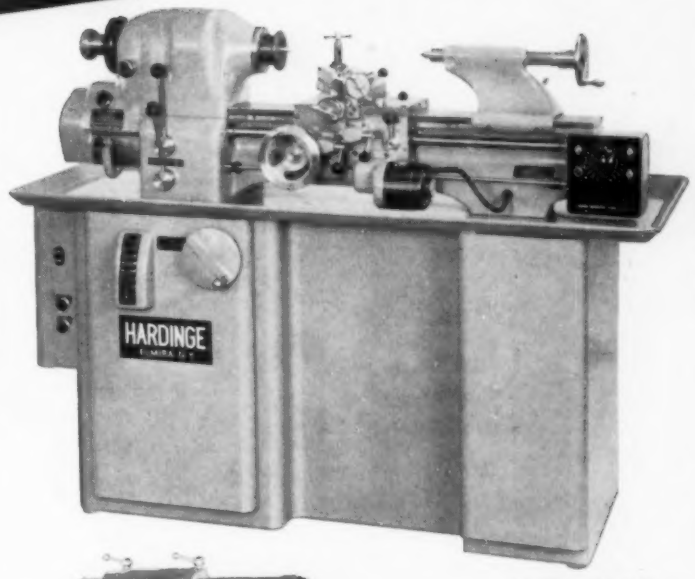

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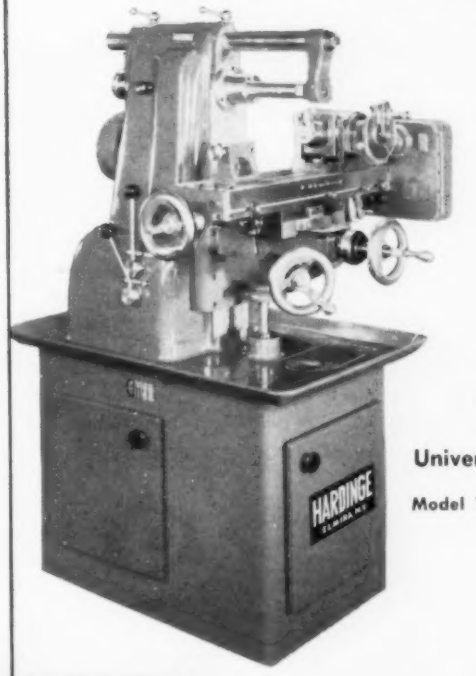

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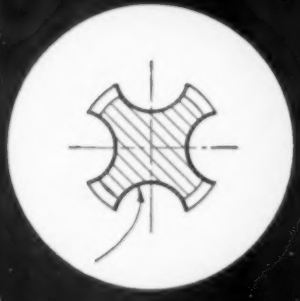
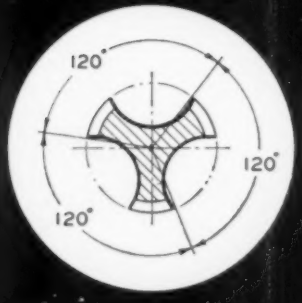
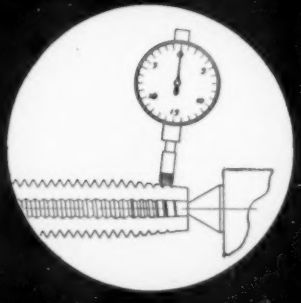


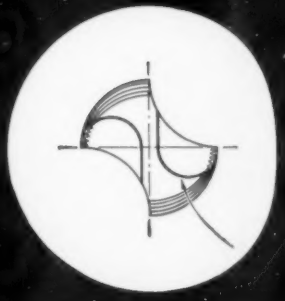
Uniform Flute Contours

Exact Flute Spacing

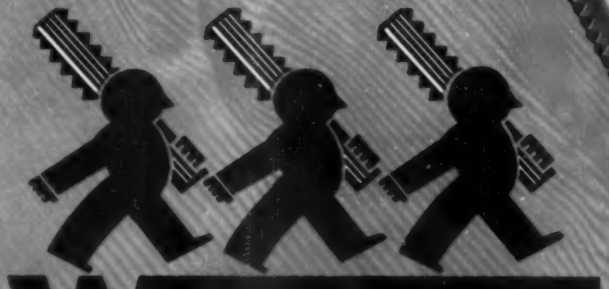


Accurate and Concentric Chamfers





Precision Chip Driver Contours



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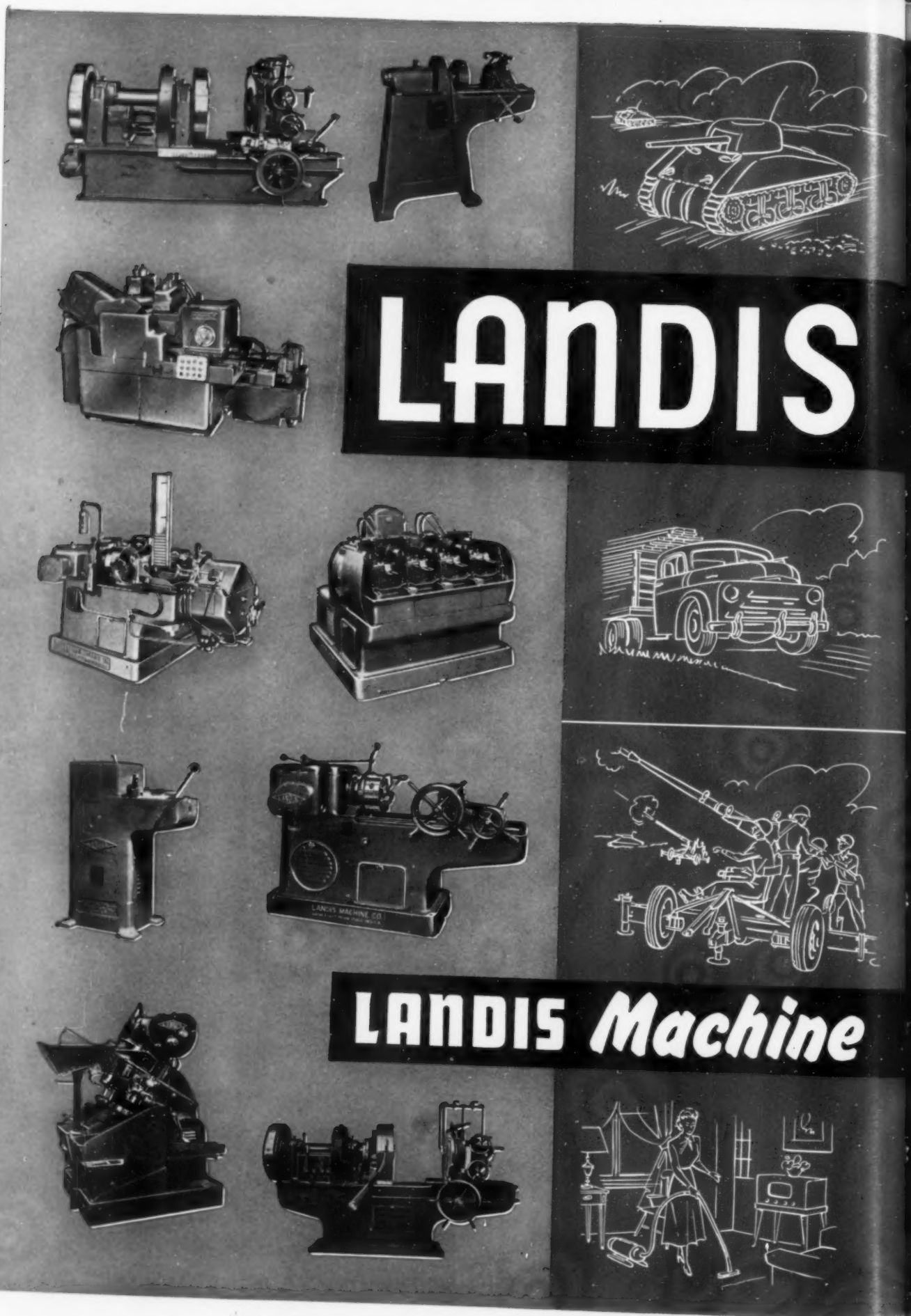
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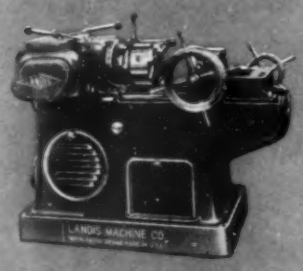
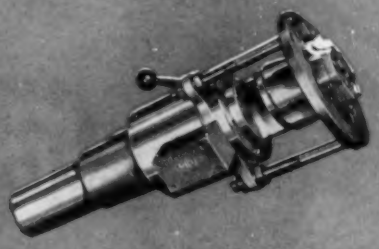
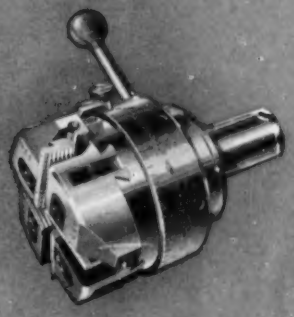




THREADS



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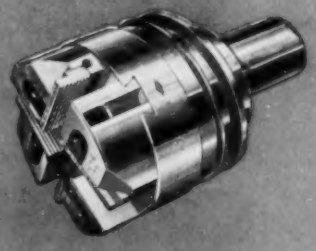

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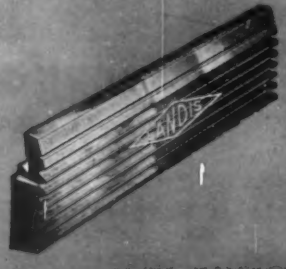

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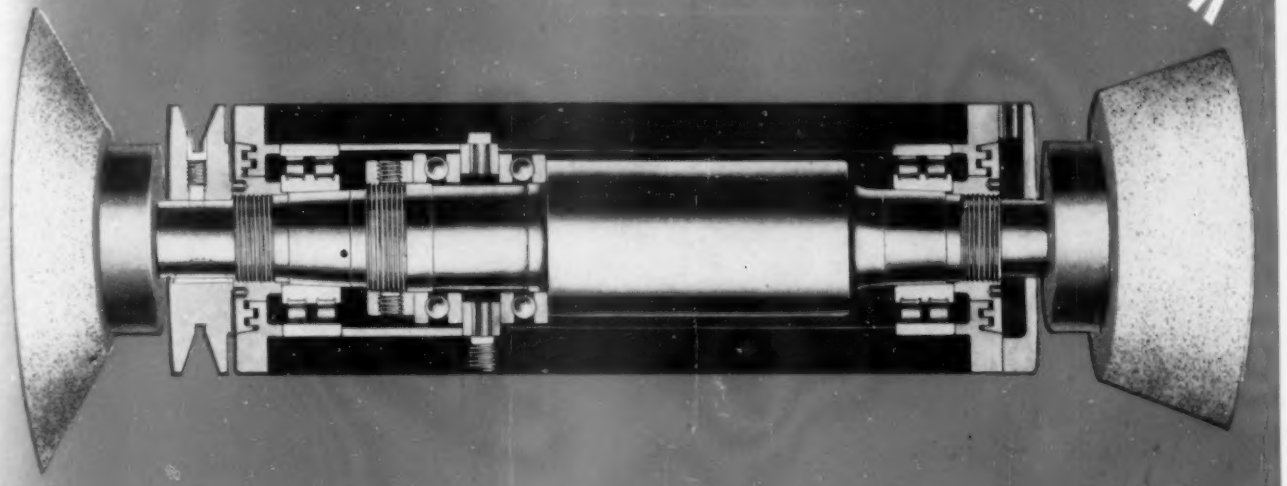

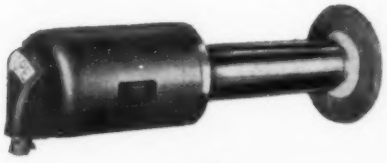

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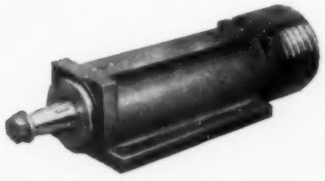

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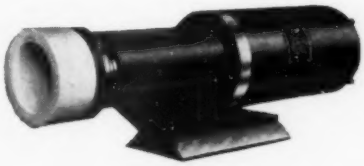

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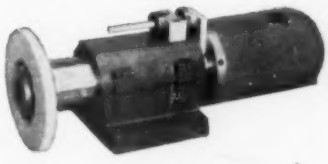

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No. 91

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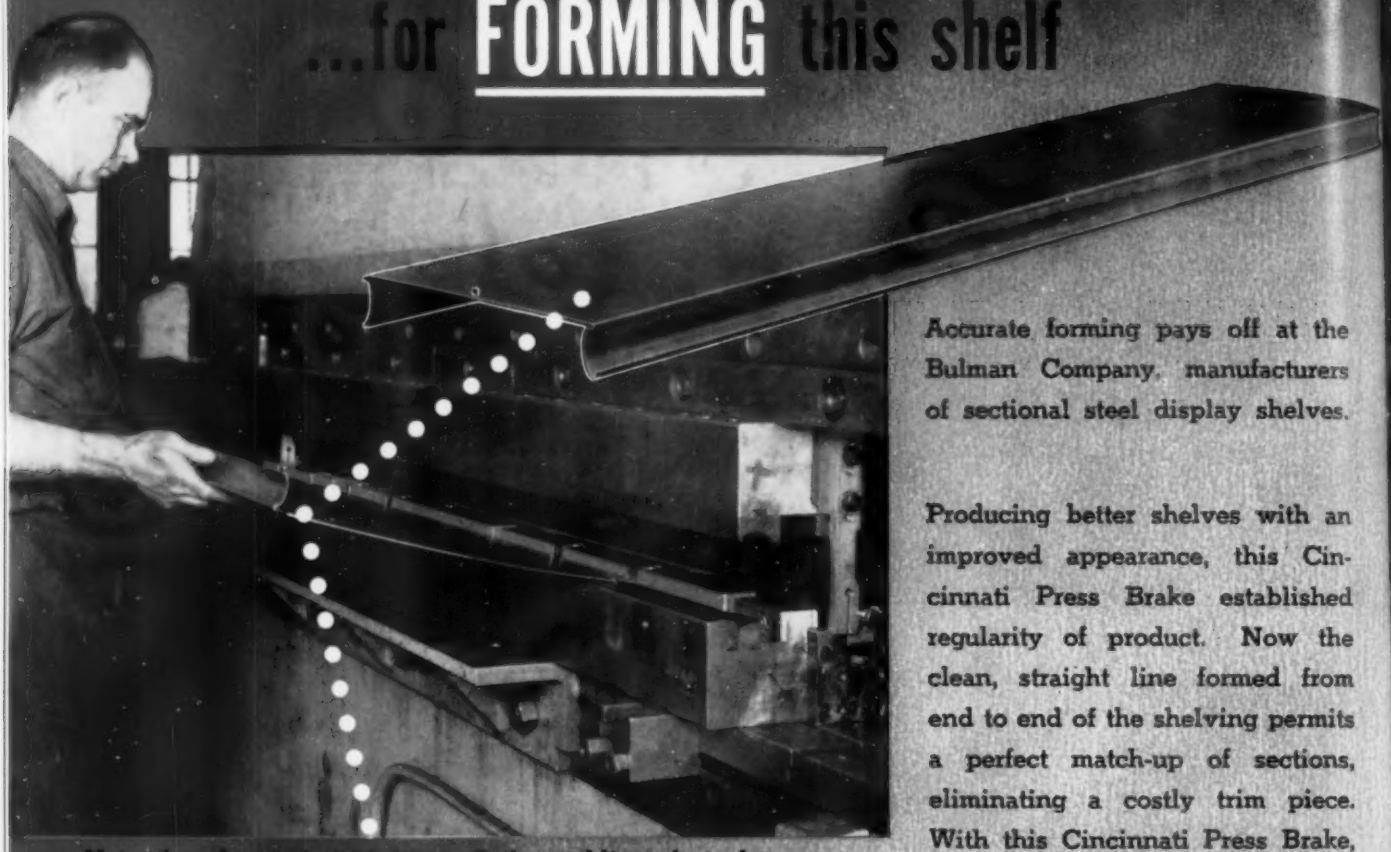

Note the clean, straight lines of the moldings formed on the shelf by the Cincinnati Press Brake.

These outstanding sectional Bulman display shelves fit accurately. *Photo courtesy E. O. Bulman Mfg. Co., Inc., Grand Rapids 2, Michigan*

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Producing better shelves with an improved appearance, this Cincinnati Press Brake established regularity of product. Now the clean, straight line formed from end to end of the shelving permits a perfect match-up of sections, eliminating a costly trim piece. With this Cincinnati Press Brake, discards are eliminated, assembly is accurate—production time cut—and the product improved. Investigate—you may cut costs and improve products in your plant with a Cincinnati All-Steel Press Brake.

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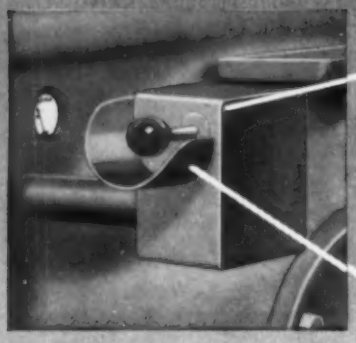
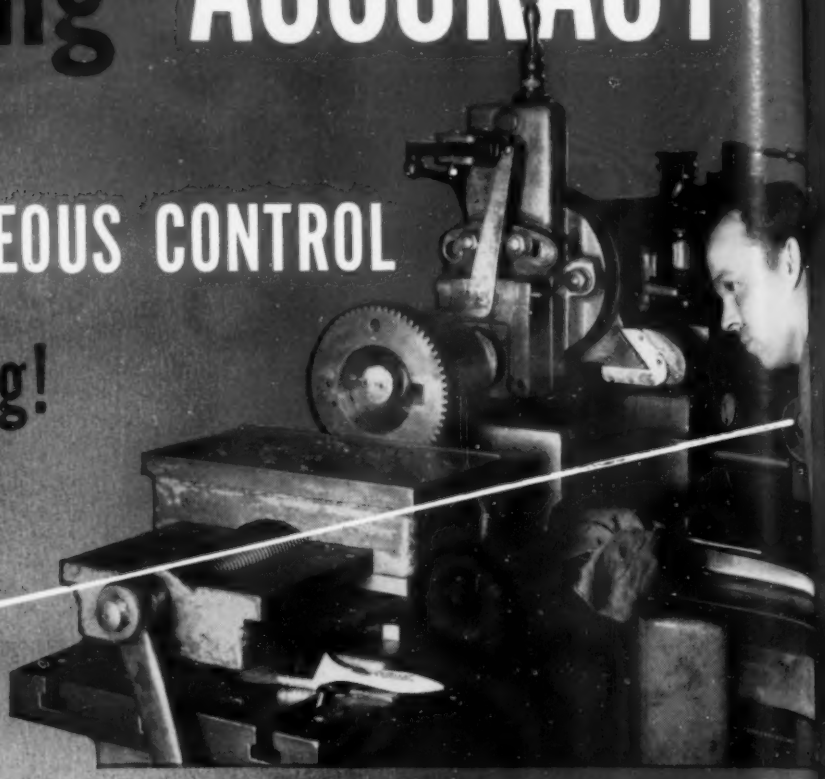
effect a 30% saving!





The time required to shape 7 separate internal oil grooves in these steel sleeves was reduced from 12.5 minutes to 8. minutes, due to the Cincinnati Electro-Magnetic Clutch and Brake.

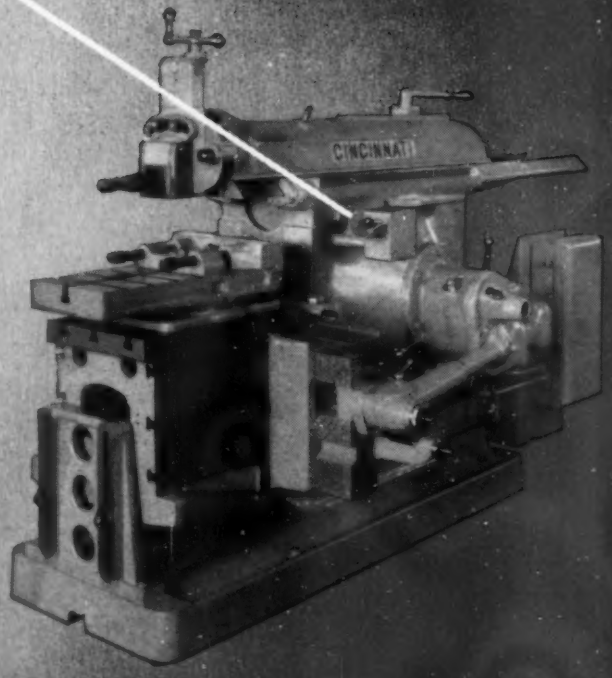
NEW CINCINNATI ELECTRO-MAGNETIC CLUTCH AND BRAKE. . . .

Where starts and stops are numerous they become a serious time waster!

The New Cincinnati Magnetic Clutch and Brake, with its single, convenient control lever, converts waste time into productive time. It gives the operator the fastest, simplest and most accurate control of his Shaper.

This powerful clutch and brake requires no shutdown for adjustment, and has a long, maintenance-free life, both time-saving and profitable features.

Write for Catalog N-5 for the complete line.



CINCINNATI

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

SATIN CHROME **MICROMETER CALIPERS** with...

A Starrett DOUBLE FEATURE

DIRECT FEEL plus FRICTION THIMBLE or RATCHET STOP

No. 231
0 to 1" range .0001" graduation
With Ratchet Stop and Lock Nut

No. 231F (at top)
0 to 1" range .0001" graduation
With Friction Thimble and Lock Nut

Only STARRETT offers this double feature in micrometer design! You can choose the micrometer that best suits your needs — either with *ratchet stop* or *friction thimble.* Both give uniform contact pressure on every measurement — insuring the same accuracy every time independent of feel. Both also provide "direct feel" — a plus feature desired by many mechanics for "feeling" certain measurements.

Ratchet stop micrometers have a convenient ratchet stop at the end of the micrometer while the thimble itself is used for "direct feel". *Friction thimble micrometers* have a friction control mechanism built into the upper section of the thimble "right under your thumb"; permitting easy one-hand operation; lower section of the thimble is integral with the spindle for "direct feel" measurements.

For consistent accuracy in precision measuring, use Starrett *Satin Chrome* Micrometers . . . they're ideal for all inspection and quality control applications. Your industrial distributor will give you prompt, dependable, quality service.

INSIST ON THESE BIG Starrett FEATURES FOR BETTER, FASTER, PRECISION MEASURING

1 **No-glare satin chrome finish** — On Thimble and Sleeve of all Micrometers and also on Frame of all Full Finish Micrometers. Easy to Read — Eliminates Squinting and Eye Strain. Highly Resistant to Stains, Corrosion and Wear.

2 **Hi-micro mirror lapped finish** — On Faces of Anvil and Spindle. Insures More Accurate Measurements. Also Available with Tungsten Carbide Faces at slight additional cost.

3 **One-piece spindle** — Extra-Rigid Integral Construction for Long, Accurate Life.

4 **Extra hard threads** — Special High Carbon Steel Gives Harder Threads Which are Hardened, Stabilized and Ground from the Solid to Insure Lasting Precision.

5 **Tapered frame** — Permits Measurements in Narrow Slots and Tight Places. Standard on All Full Finish Outside Micrometers.

6 **Rigid, one-piece frame** — Barrel is Integral with Frame for Maximum Rigidity, Accuracy and Long Life.

7 **Easy to read** — Large Diameter Thimble and Sleeve with Distinct Black Figures and Graduations Against Satin Chrome Finish. Measurements Easy to Read Under Any Illumination.

8 **Quick reading figures** — Every Graduation Numbered For Quick, Positive Identification.

9 **Convenient decimal equivalents** — of 8ths, 16ths, 32nds and 64ths on Frame or Thimble of All Micrometers.

10 **Quick, easy adjustment** — Only Two Simple Adjustments Maintain Starrett Accuracy.

11 **Lock Nut** — Permits Locking of Spindle At Any Reading. Available at Slight Additional Cost.

12 **Ratchet stop or friction thimble** — Permits Consistent Measurements Independent of "Feel". Available At Slight Additional Cost.

STARRETT TOOLS

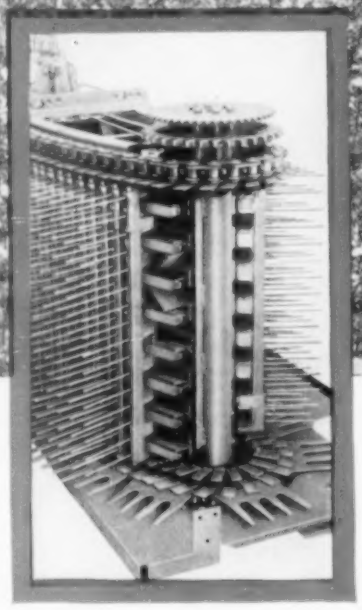
TRADE MARK **Starrett** REG. U. S. PAT. OFF.

SINCE 1880
WORLD'S GREATEST TOOLMAKERS

THE L. S. STARRETT COMPANY
Athol, Massachusetts, U. S. A.

MECHANICS' HAND MEASURING TOOLS AND PRECISION INSTRUMENTS
DIAL INDICATORS • STEEL TAPES • PRECISION GROUND FLAT STOCK
HACKSAWS, BAND SAWS and BAND KNIVES

Buy THROUGH YOUR INDUSTRIAL DISTRIBUTOR
Prompt delivery
Dependable service
Quality products



HEAT TREATING MAKES STRONG FINGERS FOR COTTON PICKERS

Plants in

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222 N. Laflin
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620 Buffalo Rd.
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LOS ANGELES
2910 So. Sunol Drive
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In the southland there's something new on the horizon . . a mechanical cotton picker. It's quite a machine . . picks two rows at once . . handles acres and acres of cotton in nothing flat compared to slow, laborious hand-picking.

It's intriguing to watch this amazing machine. It has 2,560 *rotating steel fingers* that gently probe the open cotton bolls, and deftly pick out the soft, white cotton fibres.

A few years back when the new cotton picker was in the design and testing stage, the carbon steel fingers . . all 2,560 of them came up for some serious attention. The heat treating *had* to be right. For the "fingers" had to be straight and they had to be hard. Just the right hardness . . not *too* hard or they might snap off, and not too soft or they might bend.

Allis-Chalmers brought their problem to the metallurgical and heat treating research laboratories of Lindberg Steel Treating Co. In a short time, Lindberg heat treating specialists, in cooperation with Allis-Chalmers engineers, developed an effective and successful process. It permitted the heat treating of the carbon steel fingers without scaling . . and without distortion . . to precisely the right physical properties.

Solving problems in heat treating is an everyday experience for Lindberg Steel Treating Company. Some 34 metallurgical engineers and metallurgists with a composite heat treating experience of more than 650 years are available to consult with you on any heat treating problem. Your inquiry is invited.

A case history of Lindberg Steel Treating Co. service to American industry

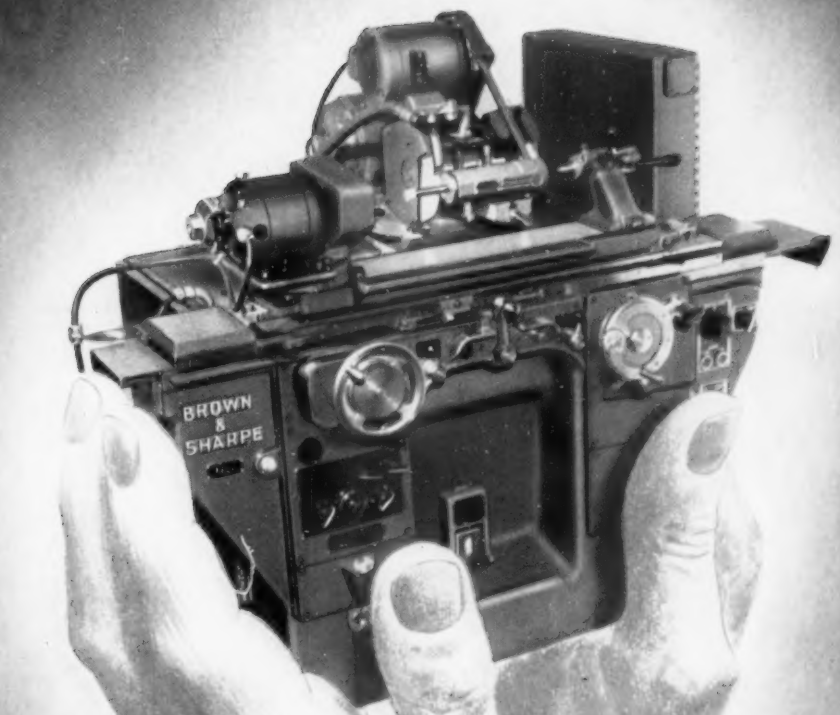
LINDBERG STEEL TREATING CO.

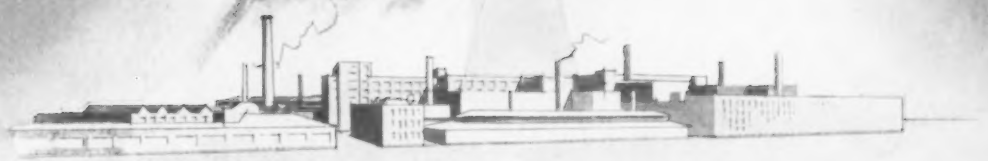
222 North Laflin Street, Chicago 7, Illinois Phone: MOnroe 6-3308

Presenting a

COMPLETELY NEW LINE

of Universal Grinding Machines

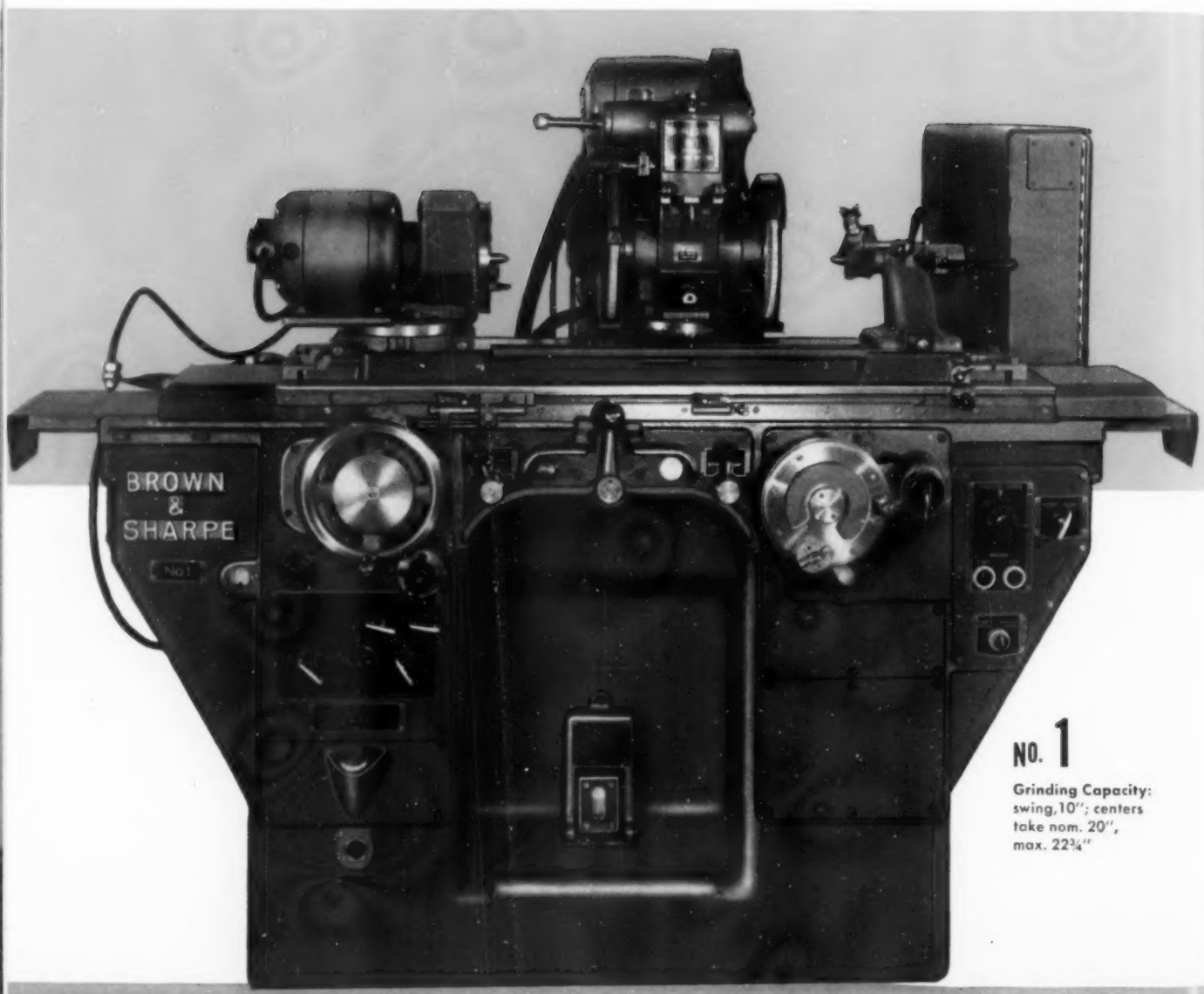




Brown & Sharpe

B·S

4 Completely New...

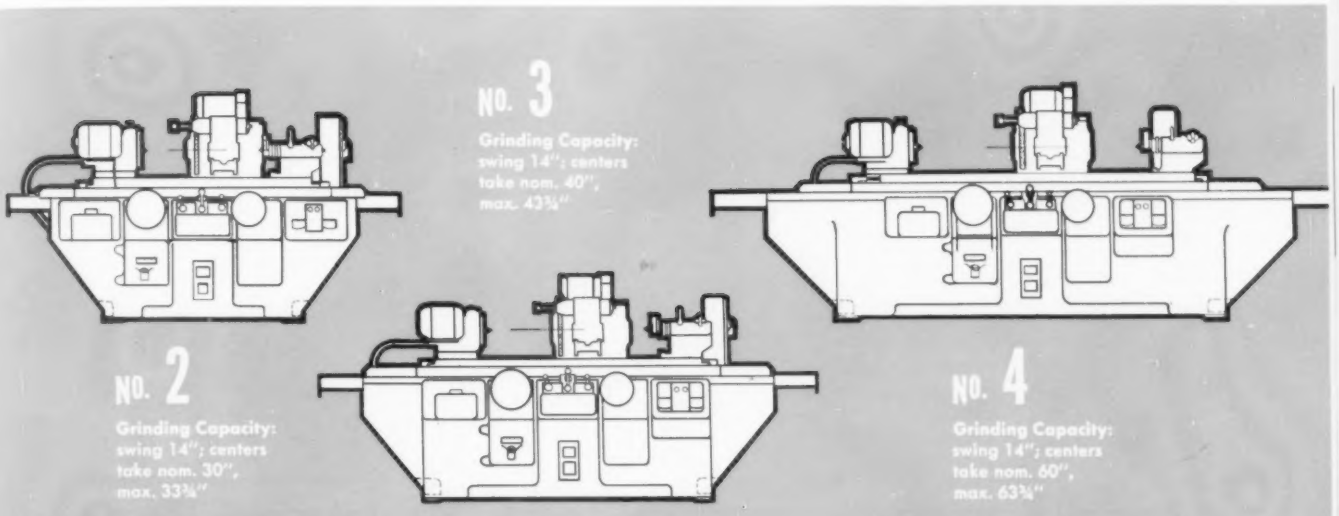


NO. 1

Grinding Capacity: swing, 10"; centers take nom. 20", max. 22¾"

Universal Grinding Machines

Productioneered to handle the widest variety of precision work at production speeds

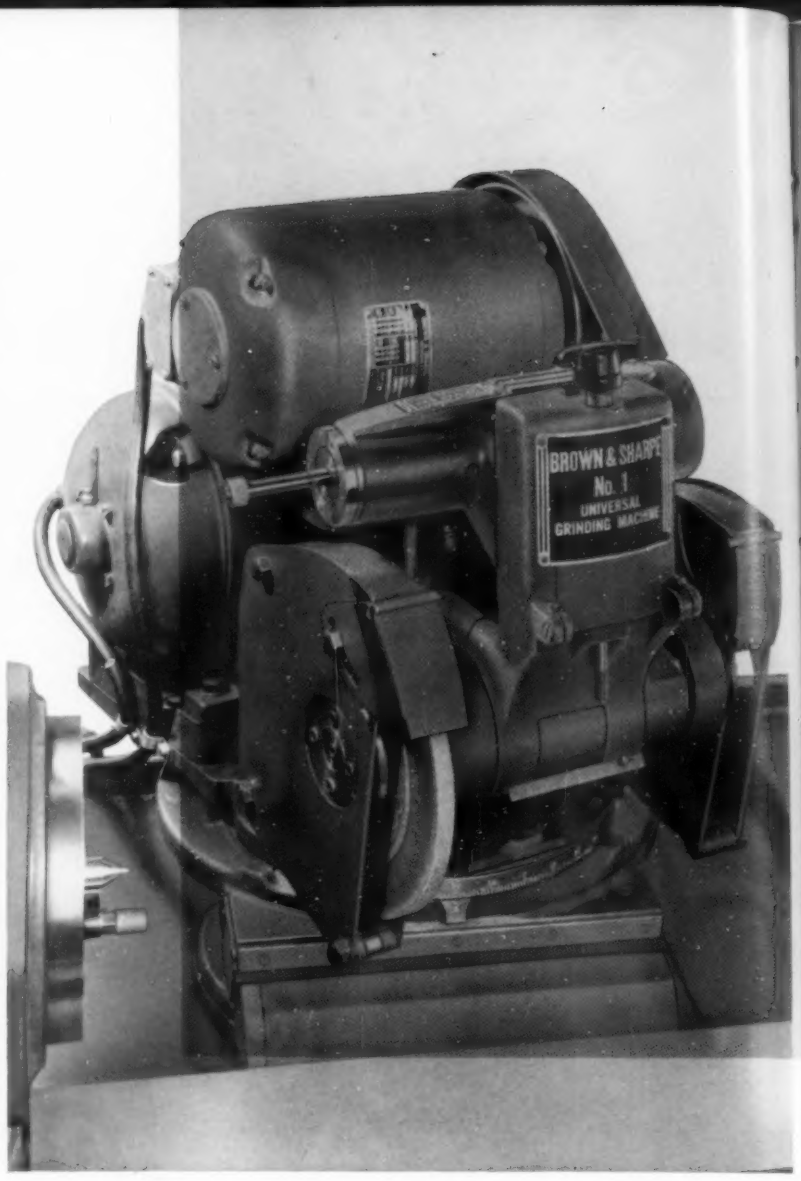

NO. 3
Grinding Capacity: swing 14"; centers take nom. 40", max. 43¾"
NO. 2
Grinding Capacity: swing 14"; centers take nom. 30", max. 33¾"
NO. 4
Grinding Capacity: swing 14"; centers take nom. 60", max. 63¾"

This entirely new line of Brown & Sharpe Universal Grinding Machines bridges the long-existing gap between conventional universal and single-purpose grinding machines. Years of extensive research and development . . . the combined talents of Brown & Sharpe engineers and craftsmen . . . have been employed to bring you this ultra-modern group of new Universal Grinding Machines. Their many new and exclusive features provide exceptional grinding flexibility, rigidity, and accuracy. Instant combining of operating functions into automatic cycles extends the usefulness of this equipment beyond the toolroom and job shop, to many production applications.

Compare these new Brown & Sharpe Universal Grinding Machines feature for feature . . . see the following page.

Brown & Sharpe B·S

Compare all these *productioneered* features



- **Completely Universal Wheel Spindle Unit**

  Design of wheel spindle unit permits either the external grinding spindle or the internal grinding spindle to be used in any desired horizontal position. Accurate compound settings can be made for combination straight and taper, or double taper grinding (both external and internal) with only one set-up.

- Removable Unit Type External Grinding Spindle
- Greater Flexibility of Grinding Speeds
- Instantly Available Internal Grinding Spindle, Independently Driven
- Hydraulic Table Drive Maintains Smooth, Constant Table Movement
- Variable Speed Headstock
- Table Throttle Permits Exact Repetition of Truing and Grinding Speeds
- Unique Universal Turret Provides Extra Work Capacity
- Faster, More Accurate Sizing
- Positive Stop on Cross Feed for Both External and Internal Grinding
- Built to Meet J.I.C. Electrical and Hydraulic Standards
- Additional Automatic Functions Available to Increase Productive Flexibility

Get complete specifications on these new ultra-modern Universal Grinding Machines and their diversified equipment — write for illustrated Bulletins.

Brown & Sharpe

Milling Machines • Grinding Machines • Screw Machines • Cutters • Machine Tool Accessories
Machinists' Tools • Electronic Measuring Equipment • Johansson Gage Blocks • Permanent Magnet Chucks • Pumps

BROWN & SHARPE MFG. CO., PROVIDENCE 1, R. I., U.S.A.

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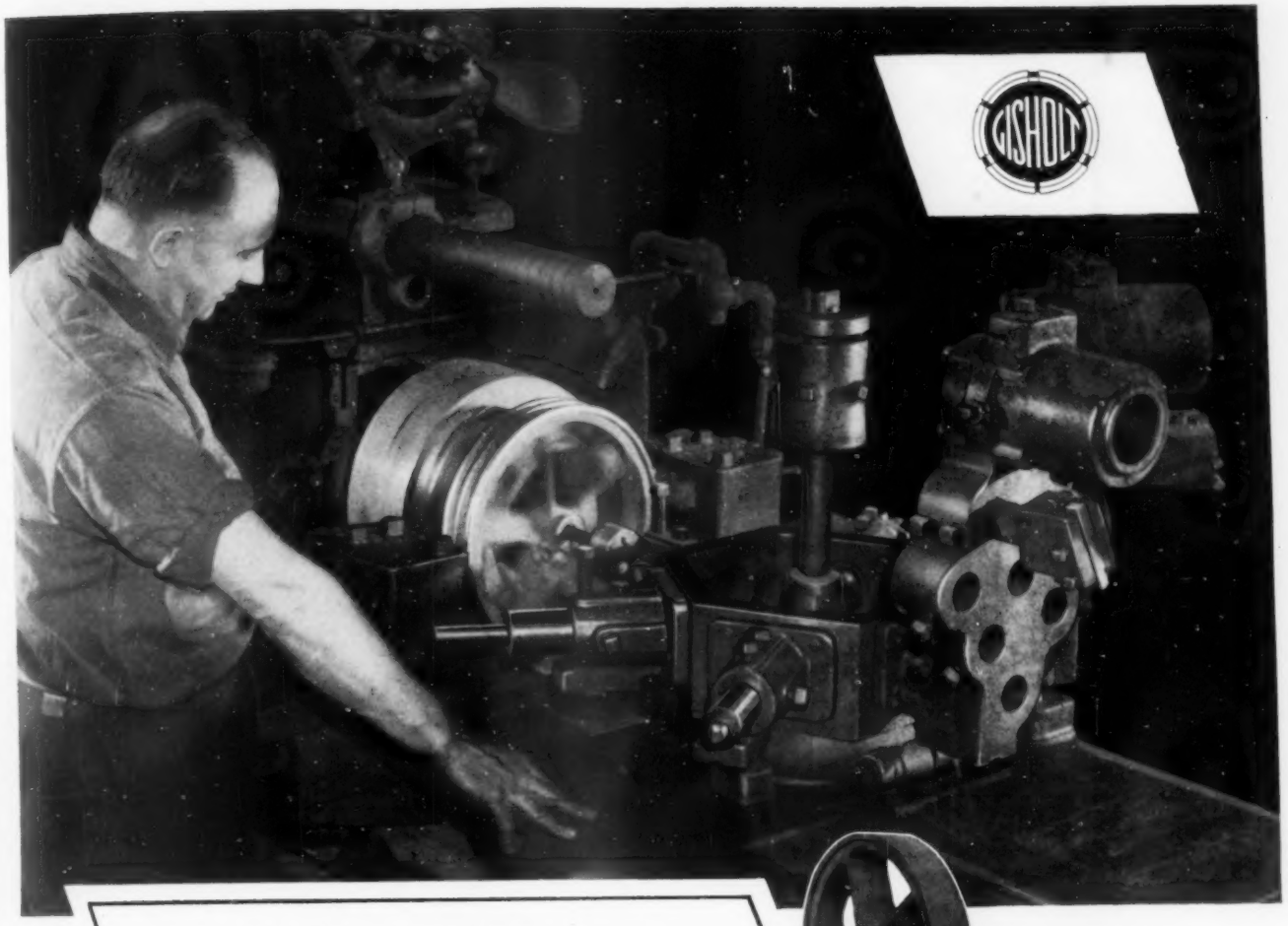


Production Trebled by the *FASTERMATIC!*

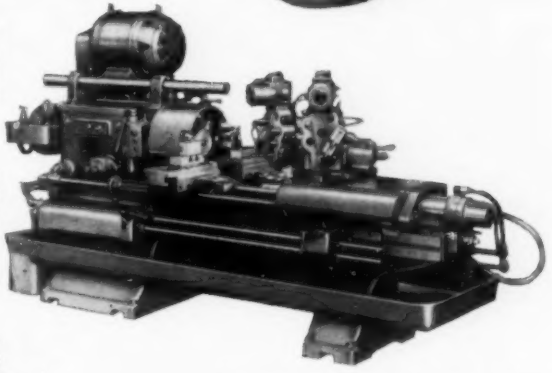
Rough Casting *Finished Sheave*

Note here the rather simple tooling arrangement for machining cast iron sheaves. This setup, similar to regular turret lathe work, is made just as easily. But here, the machine performs 15 different operations—holds tolerances consistently—completes the entire machining job in 13 minutes. The former time was 39 minutes.

Completely Automatic Cycle

It's the swift, automatic cycle of the Fastermatic that accounts for such substantial time savings. With its hydraulic feed system and automatic speed control, the operator has only to load the chuck, start the machine and remove the finished work. Usually, the operator has time to tend a second machine.

Now, when you need still greater production, it is a good time to look into the Fastermatics. Write for the Fastermatic catalog.



THE GISHOLT ROUND TABLE *represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.*

The Fastermatics are universal automatic turret lathes. Designed for accurate, high production turning, they can also be economically used on comparatively small lot work.

GISHOLT MACHINE COMPANY

Madison 10, Wisconsin

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

STERLING'S Patented Guarantees Better

This cut-away view shows one of several Allen-type screws, regularly spaced in the Easymount, engaging the retaining band and rigidly holding the wheel in place. Releasing the screws removes pressure on the band, permitting quick and easy wheel removal.

THE STERLING ABRASIVES

OF THE CLEVELAND

BRANCHES...BOSTON—CHICAGO—CLEVELAND—DETROIT

ASYMOUNT Construction
ARBIDE TOOL GRINDING

Easymount assembly rigidly retains the wheel while in use, yet permits easy removal anytime. Handles many jobs ordinarily reserved for diamond wheels! Saves time and money!

Sterling's Easymount assures longer than usual wheel life and better grinding. Close, accurate results are possible always because there can be no slippage of the wheel in the Easymount. Important too, is the fact that you need return no backplates--once attached to your machine, the Easymount lasts as long as the grinder, actually cutting the cost of your grinding assembly and resulting in a saving in future Sterling wheel purchases from 18% to 56%!

Sterling's special Easymount Wheel bonds have created new possibilities for obtaining better grinding and longer life from these superior abrasive units. You can now grind both carbide tips and shanks with the same wheel! There is also available a <u>new</u> Sterling bond which has created an Easymount Wheel that has, in many instances, replaced diamond wheels--at <u>much</u> lower cost!

Sterling Easymounts and Wheels have years of experience behind them and are in use all over the country. Try them! Realize the new economy and efficiency that is possible once you have this superior grinding assembly on your machine. Sterling engineers will gladly run a test in your plant.

BEST IN THE TEST—THAT'S STERLING

In a recent test with competing wheels, Sterling's Easymount, fitted with a GC60 J14 VAD Sterling Wheel, was reported by the customer to be the best wheel for wet grinding on carbide. It cut freer and lasted longer--the usual results you can expect on all your jobs on which Sterling's Easymount and Wheels are used in your plant.

Send for Your Free Folder on Sterling's Easymounts and Wheels!

There's important news in this attractive folder on Sterling's Easymounts and Wheels. You'll be interested in the types of Easymount wheels that are not only doing a great job on carbides, but are also very satisfactory for the fast sharpening of tools of various steels. All sizes of Easymounts and Wheels are described in this folder and a listing given of the machines they fit. Complete price data is also included. Write for your copy of this folder today . . . it will be sent at once at no obligation whatever.

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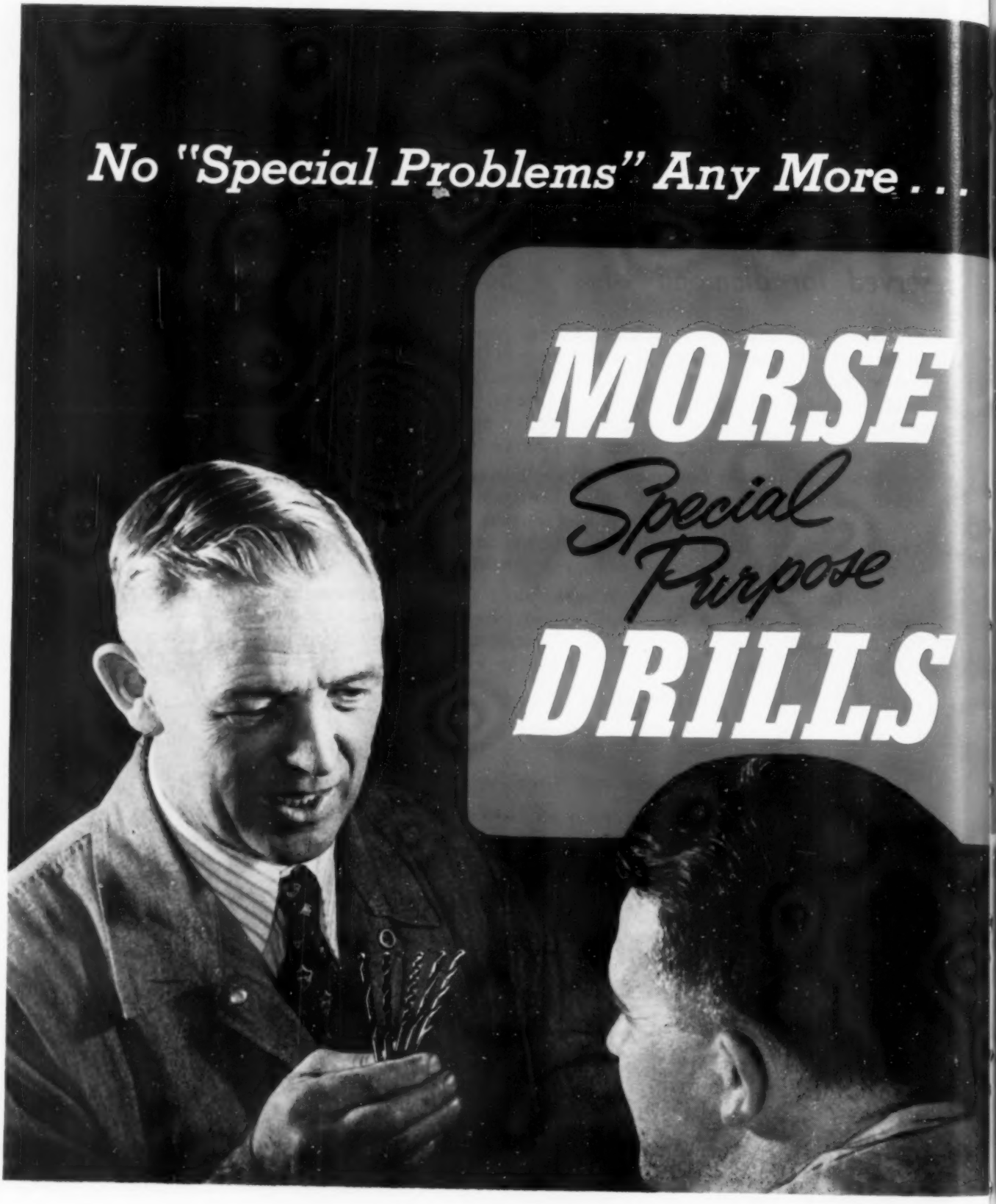
QUARRIES COMPANY

LOS ANGELES—NEW YORK—DISTRIBUTORS IN ALL PRINCIPAL CITIES

No "Special Problems" Any More . . .



MORSE

with these

BRASS DRILLS
Specially designed with slow spirals and wide, polished grooves. Slightly lower temper for use in soft, non-ferrous metals.
PLASTICS DRILLS
90° points. Specially heat-treated to resist abrasion in drilling bakelite, hard rubber and many molded plastics.
QUICK TWIST DRILLS
Fast spirals and polished flutes. For use in aluminum, magnesium, and low-tensile die-cast materials.
HEAVY DUTY DRILLS
Heavy webs give greater rigidity. For use in stainless or spring steels, hard cast iron, monel, and heat-treated metals, near the limit of machineability.
COTTER PIN DRILLS
Heavy webs. Withstand sudden torque and bending in drilling sheet metal, cotter pin holes in shafting, and poor quality castings.
MORSE
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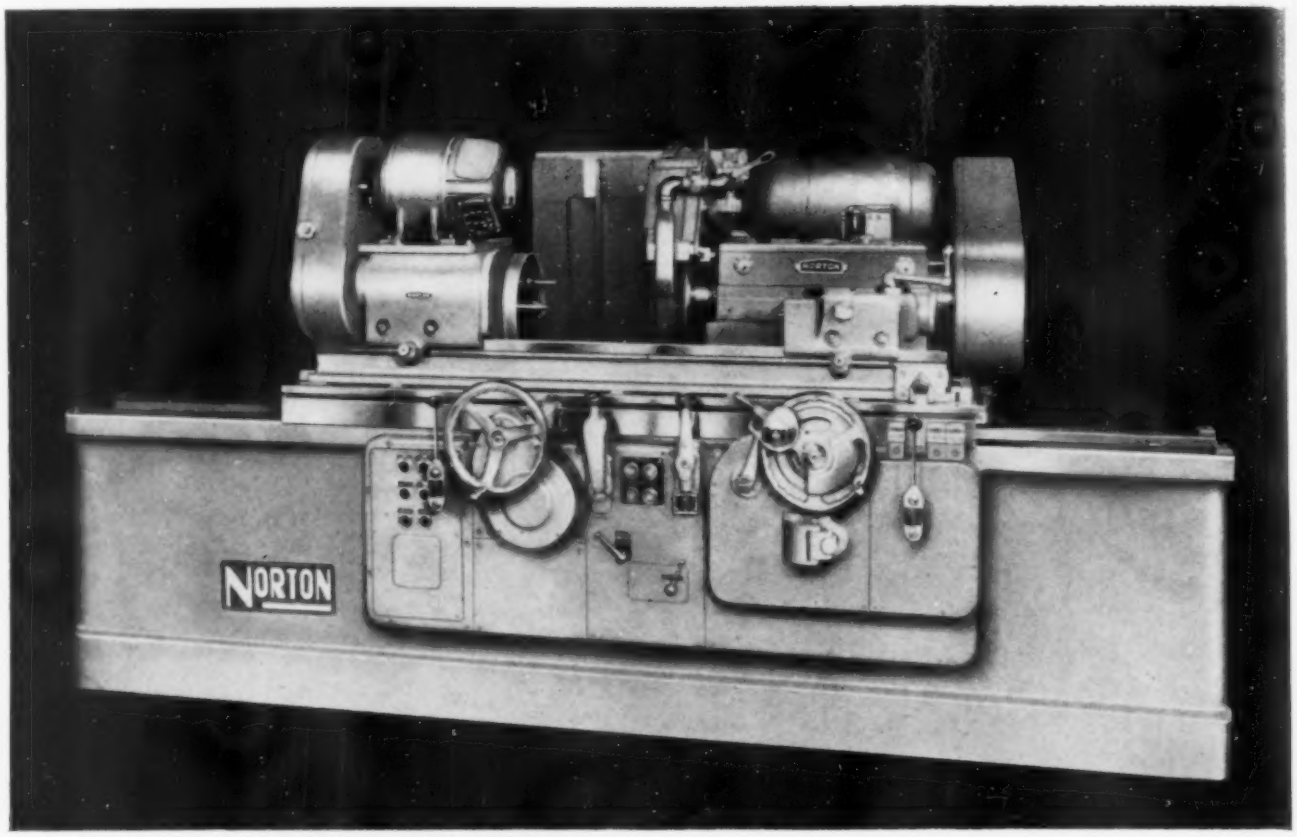
Take another good look at that range of applications for the 5 types of drills listed above. Now what's so tough about any "special job", when you can get all these Morse Special-Purpose Drills . . . and others besides . . . from your Morse-Franchised Distributor *right now?*

Call him in today, and ask him what he recommends for that job of *yours.* He has the stock, the know-how . . . and the full backing of Morse engineers . . . to trim your "unusual" drilling problems down to size, both in performance and costs. *It's your move . . . and you can't lose!*

MORSE TWIST DRILL & MACHINE COMPANY
NEW BEDFORD, MASS.
(Division of VAN NORMAN CO.)
Warehouses in New York, Chicago, Detroit, Houston, San Francisco

Cutting Tools

Buy them by phone from your Morse-Franchised Distributor and save ordering time



NORTON 10" TYPE CTU SEMIAUTOMATIC GRINDER is first choice in production lines and in job shops. No other cylindrical grinder offers you such a unique combination of speed, accuracy, flexibility and sturdiness. No wonder users have reported that Norton 10" CTU's have doubled production . . . replaced 2 or 3 machines . . . eliminated extra operations . . . made operators more productive . . . and have given them the "Touch of Gold". *Catalog No. 1787* has complete data on sizes, advantages, features and optional equipment that help you put extra profits into your production. It will pay you to look into the high-speed, high-finish grinding this machine makes possible.

These cylindrical grinding machines give you "TOUCH OF GOLD" value ... in your profit margins

The Norton CTU is such a money-maker it brings you the touch of gold. It adds value to each piece of work it handles — and it actually cuts the cost of grinding . . . thus adding to your product profits.

It's easy to see why. Your operator loads the work . . . *touches one lever* . . . and stands by while the machine does the rest . . . as easy as 1-2-3.

Work is automatically ground to size under electric timer control . . . and the wheel head resets itself for the next cycle.

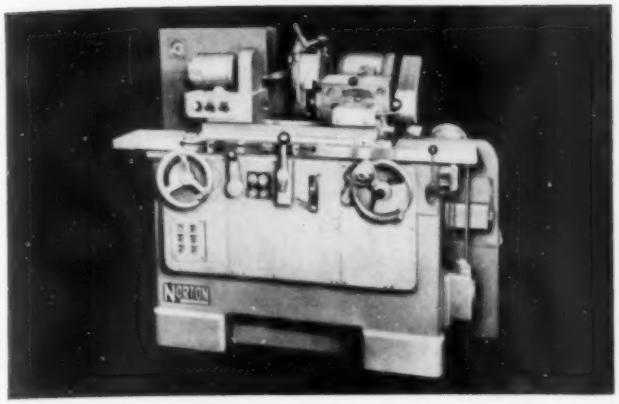
All three basic Norton CTU Semiautomatic Grinders: 4", 6", and 10" offer you the same advantages over their different ranges of work sizes. You can also get the 6" grinder with a 10" swing and the 10" grinder with a 14" swing by specifying Type LCTU. The Norton line of Type CTU Cylindrical Grinders also includes plain machines for traverse grinding. Your Norton Representative will be glad to help you choose the one that best fits your requirements.

Norton Cylindrical Grinding Machines are just one phase of *the world's most complete line of grinders and lappers* . . . products of Norton's engineering leadership in the development of both grinding wheels and machines.

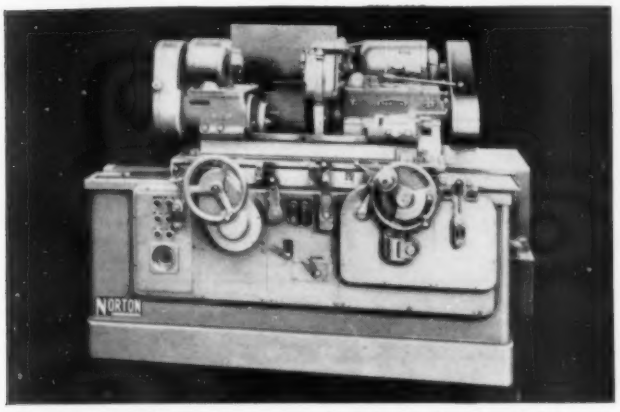
Remember — only Norton offers you such long experience in both grinding wheels and machines to help you produce more at lower cost . . . to have that "Touch of Gold."

Norton welcomes opportunities to work with you on the planning level to fit standard or special grinding machines into your immediate plans or for "post emergency" production.

For complete information, see your Norton Representative or write us direct for the catalogs listed under the machine illustrations. NORTON COMPANY, Machine Division, Worcester 6, Mass.



NEW NORTON 4" TYPE CTU Semiautomatic Grinder in 12" and 18" work length capacities now makes it practical for you to apply high-finish grinding for adding value to small parts. *Catalog No. 531* gives you full details.



NORTON 6" TYPE CTU Semiautomatic Grinder, in 18" and 30" work length capacities, has a performance record that's worth investigating. *Catalog 1488* tells the whole interesting story.

for your product

To Economize Modernize With NEW

NORTON

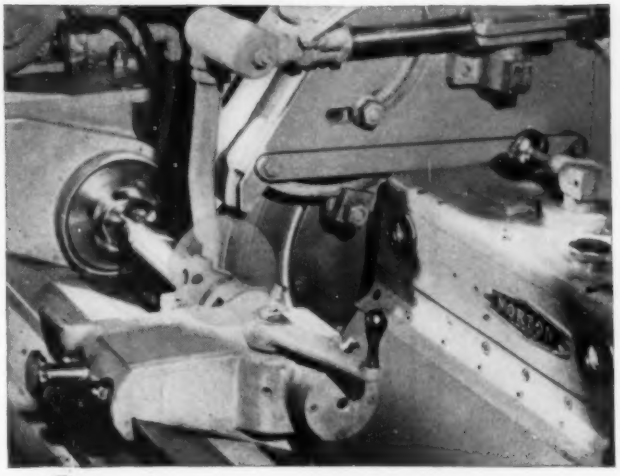
GRINDERS and LAPPERS

Making better products to make other products better

District Sales Offices: Hartford • New York • Cleveland • Chicago • Detroit
In Canada: J. H. Ryder Machinery Co., Ltd., Toronto 5, Ontario

EASY AS 1-2-3

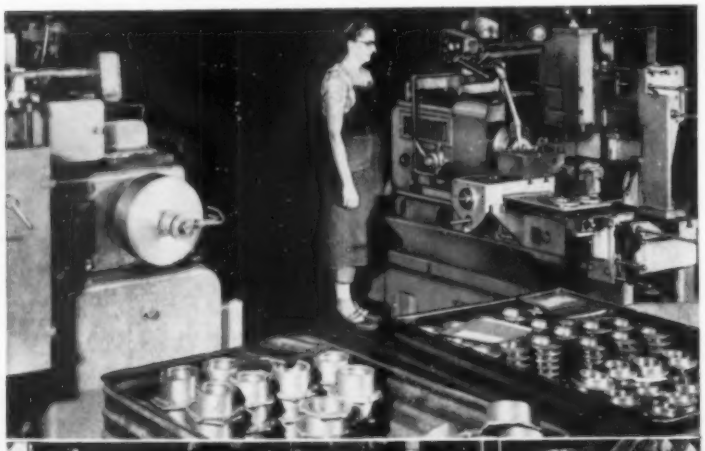
1. Operator loads machine and touches starting lever.

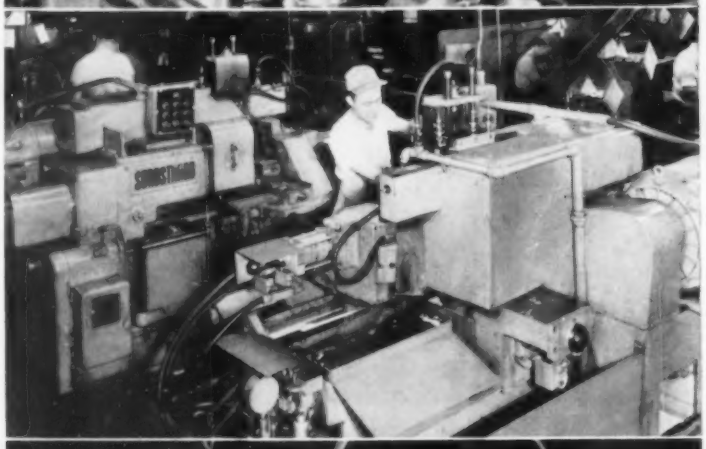


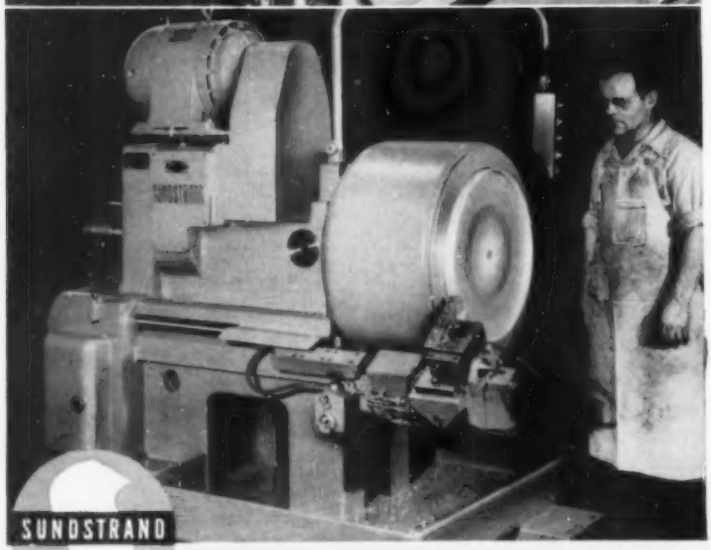
2. Machine automatically grinds part to required size and finish — while operator attends another machine.

3. Operator unloads machine.

Why SUNDSTRAND AUTOMATIC LATHES CAN INCREASE YOUR PRODUCTION *on jobs like these...*







① Small Lot Turning

The two Model 8A Automatic Lathes installed with facing fronts, as shown at left, are part of a modern Sundstrand turning battery. Thirty-two different parts of cast iron and steel are turned in lot sizes varying from 150 to 200 pieces per lot. Production increase is as high as from 40 to 150 parts per hour compared to former method.

Because of the ease and simplicity of operating Sundstrand Automatic Lathes, one operator is able to handle 2 machines. If you have turning problems consult a Sundstrand methods engineer. There is no obligation for this service.

② Long Run Turning

Here's fast, profitable machining of a pump body part requiring turning, facing, chamfering, drilling, and counter-boring operations. All are performed on a Model 8A Sundstrand Automatic Lathe with multiple tooling and automatic cycling. Two of many features contribute to the efficiency of this installation. First, the machine is automatic and completes a rough and finish cycle, once started by the operator. This enables one operator to run two machines and produce 132 bodies per hour instead of 40 per hour as obtained with the previous equipment and method.

③ Special Turning

The Sundstrand special short bed lathe illustrated is used for turning and facing the open end of a washing machine tub. It has a special tool block guided by a roller that rides against the O.D. of the tub and moves the tool to conform with any irregularities in the tub diameter. The short bed permits easy end loading and unloading to maintain a production of approximately 85 pieces per hour.

The prominent manufacturer who installed this and several other Sundstrand Automatic Lathes found he could do more work with fewer machines by using Sundstrand Automatic Lathes and "Engineered Production" Service.

SUNDSTRAND

RIGIDMILS • AUTOMATIC LATHES • HYDRAULIC EQUIPMENT

SOME OF THE DESIGN FEATURES THAT MAKE THIS PRODUCTION POSSIBLE

Greater Horsepower

All new Sundstrand Automatic Lathes have been re-designed for greater rigidity and larger spindle drive motors. They have ample power for use of carbide cutting tools and are capable of doing more work.

Wider Speed Range

Spindle speed range ratios have been increased to 30 to 1 to obtain maximum in cutting efficiency over a wider range of sizes of parts and material. The spindle unit is equipped with two driving gear centers, which increase the range between high and low spindle speeds. In addition, four speed changes can be obtained from one set of gears instead of the usual two.

Wider Feed Range

A wider feed range has been provided to enable the handling of a greater range of parts and materials at maximum cutting efficiency. The New Models 4A, 8A, and 12A have a ratio of 18 to 1 between high and low feeds — Model 16 has an even greater range.

Greater Carriage Adjustment

Both front and rear carriage of the latest Sundstrand Automatic Lathes are adjustable full length between headstock and tailstock centers — another important new feature.

Faster Set-Up

Convenient location of pick-off gears for changing spindle speeds and front and rear carriage feeds is provided. Feed and speed chart and pick-off gear storage compartment are readily accessible for quick set-up or changeover.

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SPEED RANGE (Type A) (Type B)	60 to 1800 RPM 120 to 3600 RPM	40 to 1200 RPM 60 to 1800 RPM	30 to 900 RPM 40 to 1200 RPM	15 to 750 RPM
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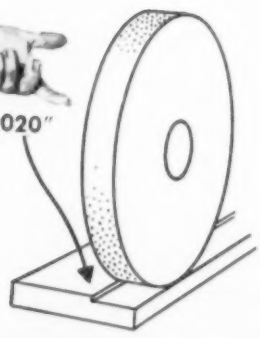

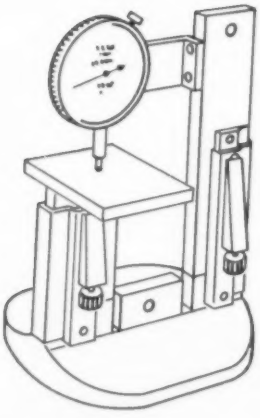

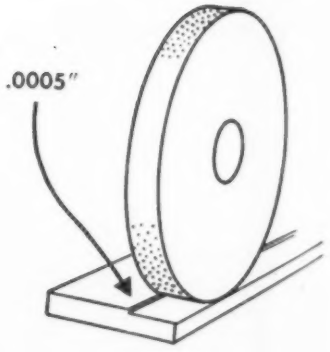

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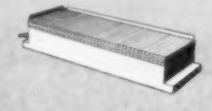

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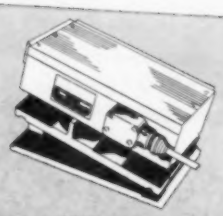

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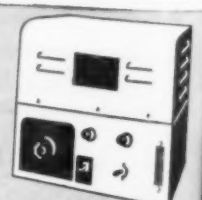

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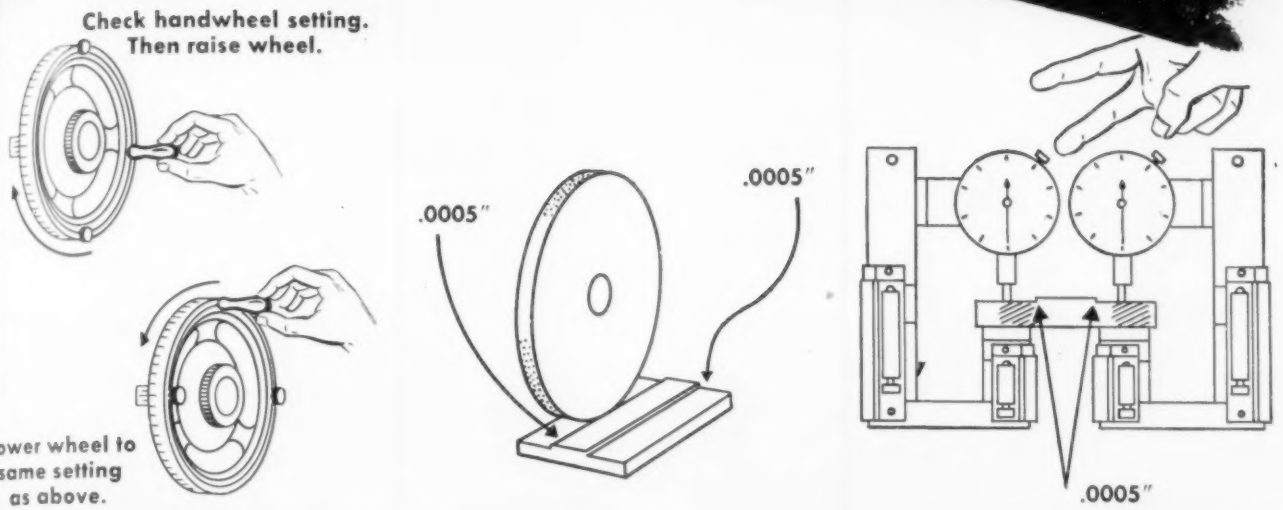

4. Check the hand wheel setting, then raise the grinding wheel. Now move the work piece to the opposite side and lower the grinding wheel to the exact setting of the preceding cut.

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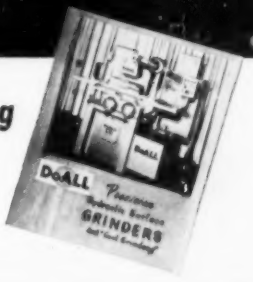

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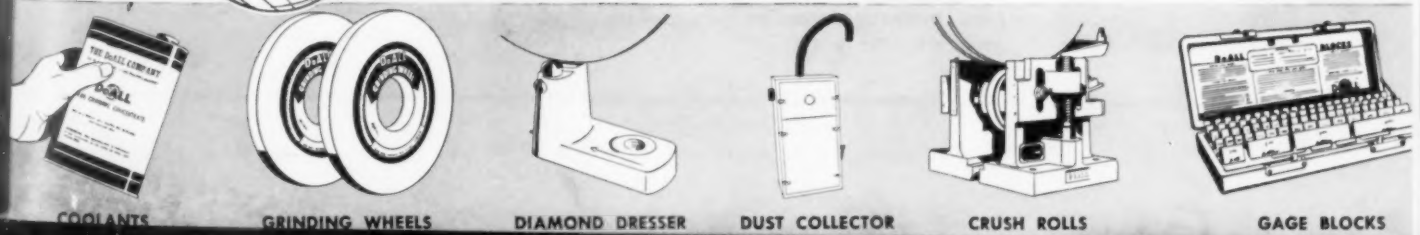

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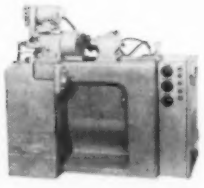

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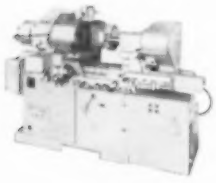

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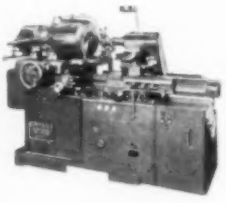

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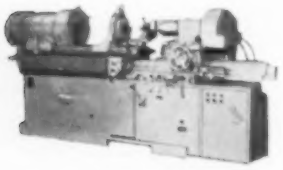

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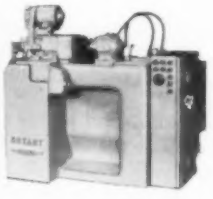

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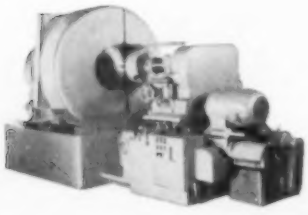

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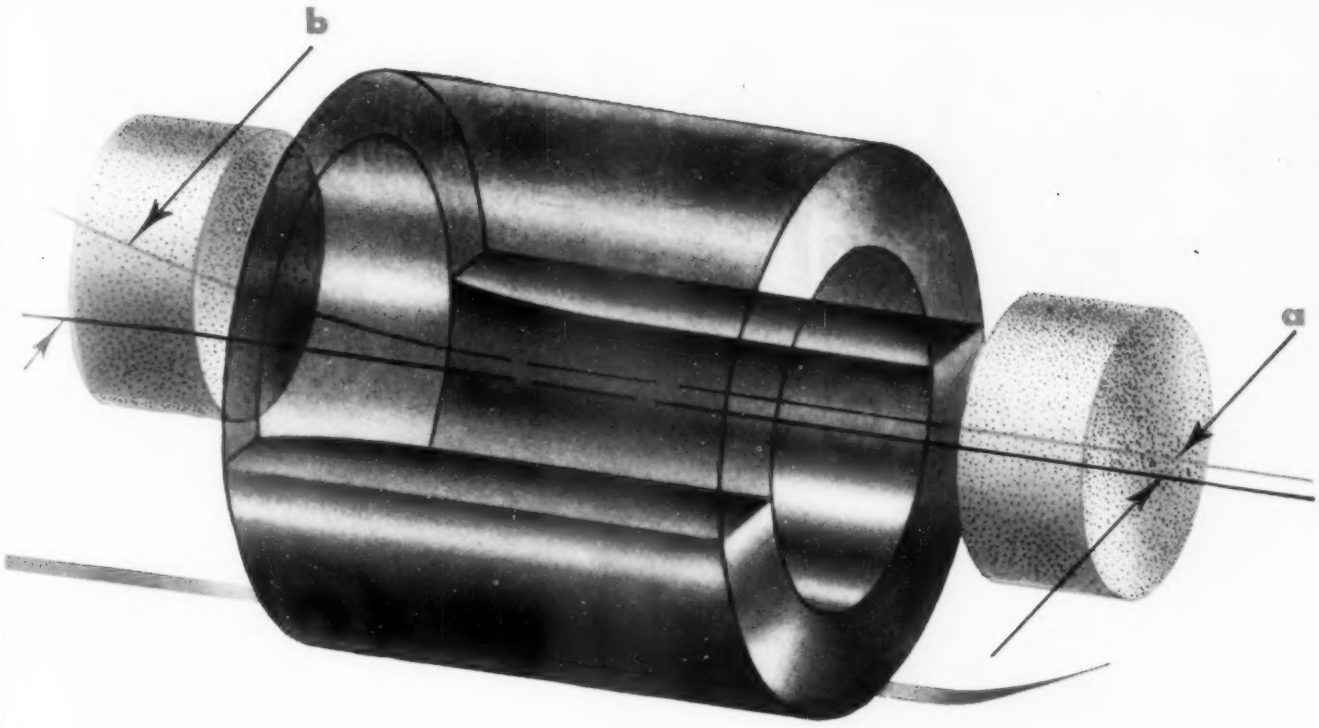

BELL mouth holes are a common internal grinding error. General available information advises simply turning the workhead or changing the length of traverse to correct this error, to generate a straight hole. In the case illustrated above, where bell mouth exists at one end of the hole, neither turning the workhead nor changing the length of stroke will correct this error.

In order to grind a straight hole the wheel must traverse the work in a straight line parallel to the axis of the work. The wheel path (the line in which the wheel traverses) is controlled by the slides under the wheelhead. If the slides are straight and true, the wheel path will be a straight line. If the path of the wheel varies from a straight line, the variation will be generated in the work.

At point "a" the wheel path and axis of the work are parallel and the wheel is set to grind a straight hole. Because of an error in the wheelslide ways, the wheel path is distorted and the wheel is plunged into the back end of the work and the wheel path and work axis diverge as shown at point "b". Wheelslide error can introduce distortion of many types within the work in addition to the one illustrated. The remedy is to correct the wheelslide ways which will, in turn, straighten the wheel path. The wheel contact will be improved, resulting in better finish.

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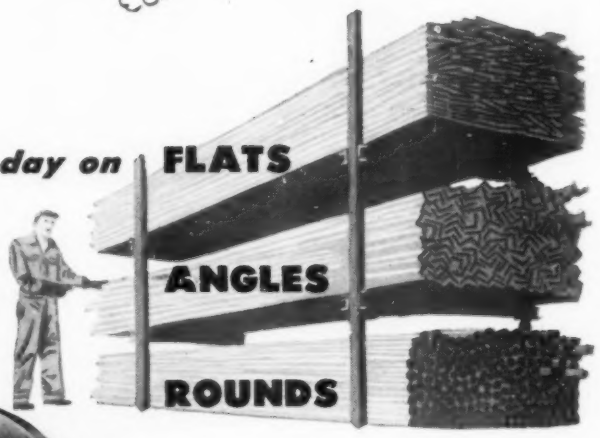

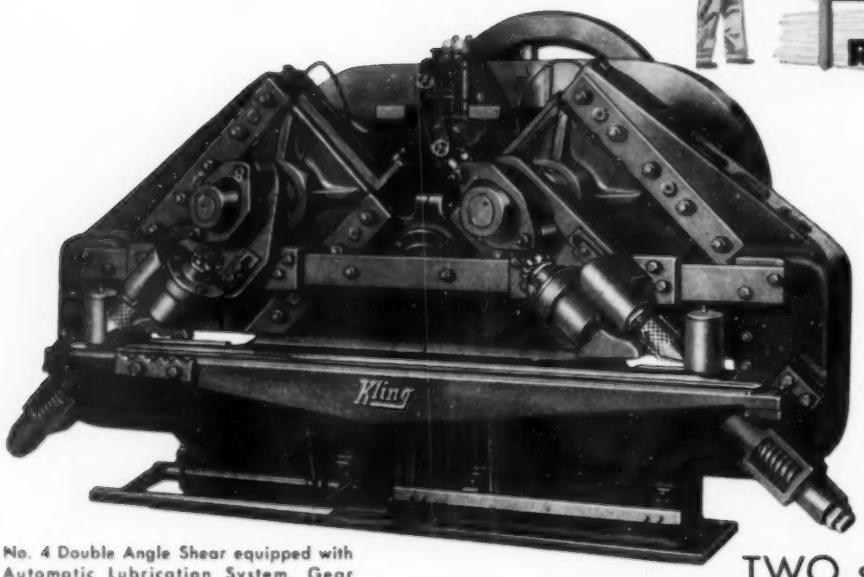

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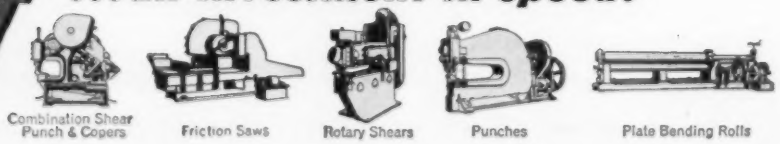

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The **Tool Engineer**

Good-bye and Hello

This is the last time I shall have the opportunity to talk to you as president of our Society. This year has been one of the most rewarding experiences of my life. It has been most enjoyable to meet and talk with many of you and your associates in your own home chapters and communities.

At times I might have expressed annoyance for your seeming apathy, criticized you for apparent indecision, but also I have complimented you for your interest and contributions to your chapter's program and I sincerely hope occasionally aroused you to an even greater awareness of the real meaning of ASTE. I have endeavored through the medium of this page to portray some of the more important functions and aspects of our Society. I have stressed how we must make contributions to engineering education and how we must provide strong leadership for the training of the engineer of tomorrow. It is important that we are always vigilant so that all of the potentialities of the Society may be completely developed to further enhance our membership.

Serving our Society as president is an enviable experience privileged to few. The responsibilities and demands of the office are many yet, owing to the farsighted planning of our founders, many of the burdens of the office are shared by all our national officers and directors.

In Chicago last March in my first talk as your president I stated that being accorded the privilege of serving as president of a Society with a heritage of free expression is an honor devoutly to be wished. With original ideas we develop. Through free expression, we consolidate and by consolidation we continue our amazing progress.

L. B. Bellamy

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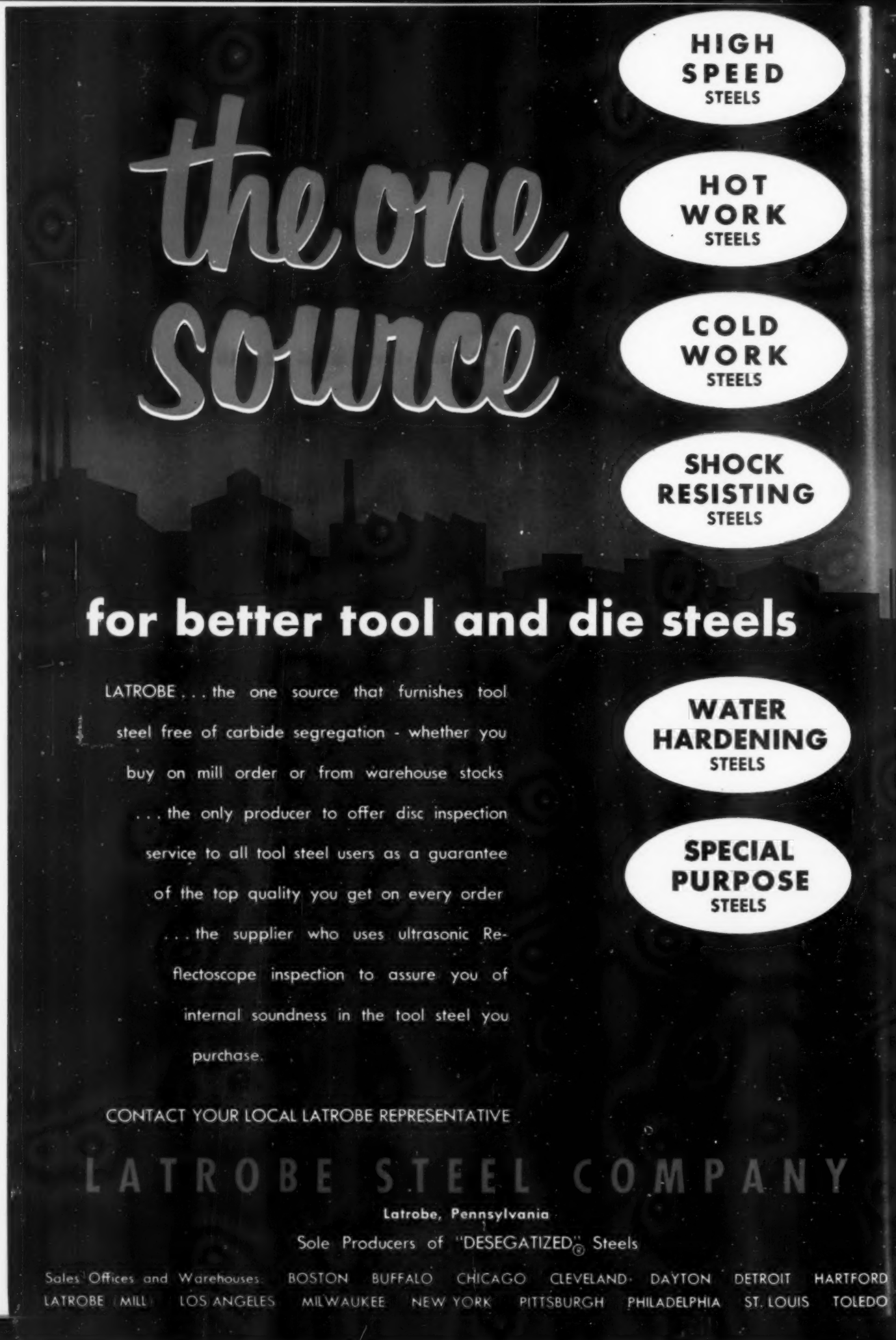
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SIMPLIFIED TOOLING Doubles Production

By Frank L. McKeen*

Engine Manufacturing, Engineering Dept.
Ford Motor Co.
Dearborn, Mich.

NEGLIGIBLE DOWN TIME for tool setting and greatly increased production have resulted from recent research and developments in tooling. The program which resulted in this achievement was instigated in 1949 to increase the productivity of crankshaft turning operations. The most interesting single accomplishment of the program, insofar as tooling was concerned, was the design of a new tool with accurate dimensions and a built-in gage which reduces to a minimum the time required for setting carbide bits to exact position in the machine, *Fig.* 1. Other improvements also have contributed to the increased number of crankshafts produced per machine. These include increasing the spindle speeds, reducing cycle time, and changing the design and material of the workpiece.

The lathe utilized in these tests, is a standard center-drive machine. Designed for spindle speeds of 36 to 40 rpm, it was modified to obtain speeds of 90 to 200 rpm. The machine alterations included the change gears; tool layouts to accommodate cast alloy and carbide inserted tools; chucking mechanisms for locating the workpiece in positive, milled driving pads; and hydraulic and electrical systems to accommodate increased pressures and eliminate long dwell periods.

Tooling Tests: The original tooling employed form-tool layouts consisting of 26 tools of eighteen details. With high-speed steel tools and a spindle speed of 36 rpm, production was about 11 pieces per hour for the cast-steel crankshaft. Tool settings were made by trial and each tool required up to 10 minutes for positioning. Each tool averaged 25 to 35 pieces before requiring regrinding. Therefore, considerable production was sacrified to down time for tool setting. In regrinding the tools, an average of one-quarter inch was removed per grind, giving a miximum tool life of about 10 regrinds.

The first tooling change was the substitution of cast alloy tools, still employing form grinding. Spindle speeds were increased to 76 rpm. Other speeds up to 139 were tested with satisfactory results. The speed of 108, however, gave the best

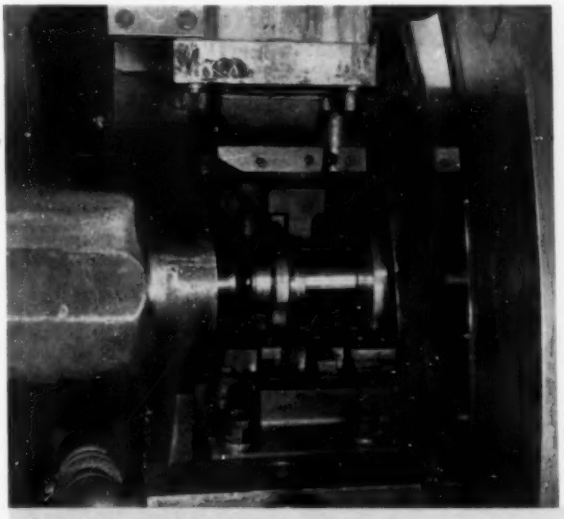

Fig. 1. Special tooling employing standard inserts reduces setup time by 90 percent.

*Senior Member ASTE Detroit Chapter.

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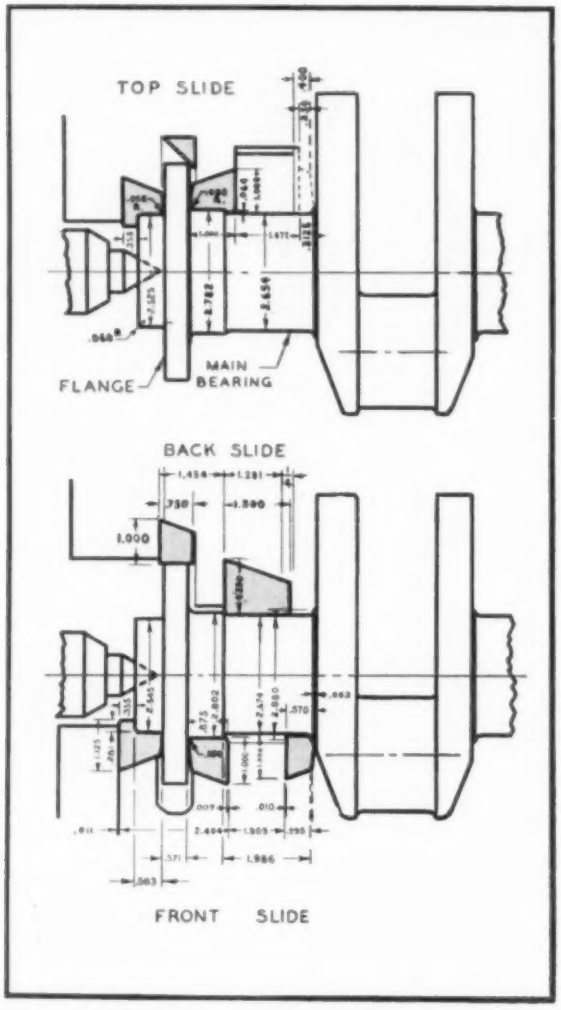


Fig. 5. Above. Improved form tooling substitutes fillets for grooving on main bearings.

Fig. 6 Below. Early design of block type tool using several carbide bits. This design restricted precise adjustments.

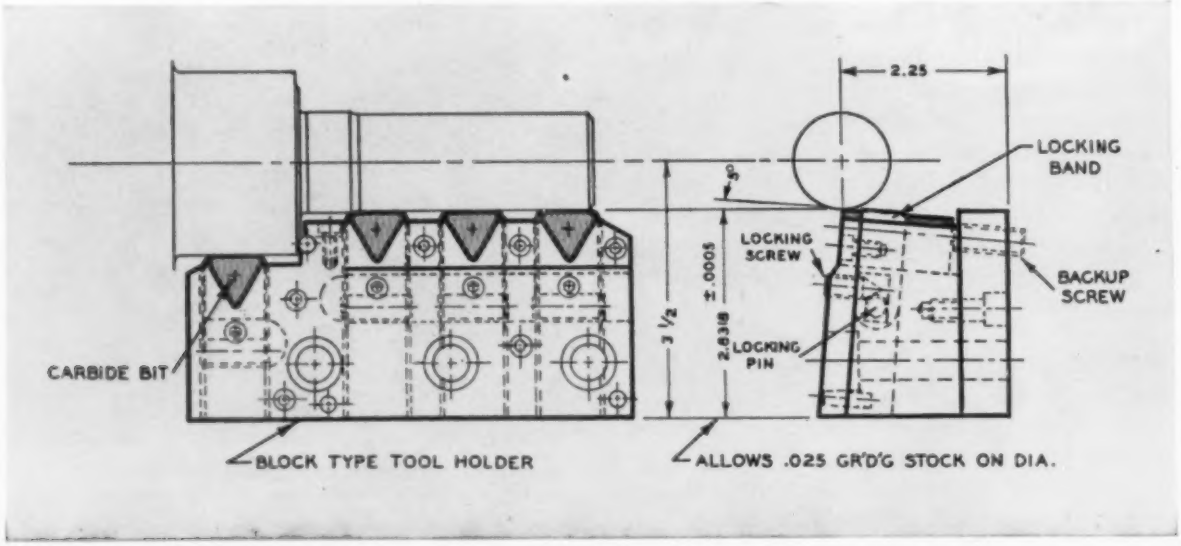
all-round performance using feeds from 0.025 to 0.008 inch. These tools were preset in the cutter-grinder room, being adjusted by jackscrews in the tool. In this setup, the tool blocks were modified by welding pads on them so that accurately dimensioned toolholders would be in cutting position when placed in the blocks, obviating trial runs for tool setting. In this way all tools of the same type were interchangeable in the tool blocks. Based upon 1500 tools that were checked, each tool averaged 170 pieces before regrinding. An average of 0.150 inch of each tool was removed in each regrind.

In the third and present tooling, simplified design eliminates 90 percent of the setup time. Instead of form tools, standard carbide bits are employed in precision holders, *Fig.* 2, and positioned so that forming is achieved by the tool position. Also, the crankshafts, being precision cast, are more accurate, have smoother surfaces and, consequently, require less machining than former materials.

At the beginning of the tests, a spindle speed of 108 rpm was employed. This speed was later increased to 139 and is giving excellent results in production, averaging about 25 pieces per hour. Pieces machined per cutting edge of the tool bit average about 1500.

No direct comparison is possible between the production of the third tooling and the previous ones because the material of the workpiece and the amount of stock removal were altered. It is interesting, however, to observe how a coordinated approach to a problem can increase overall production markedly. Summarized in TABLE 1 are the significant production figures for each of the three types of tooling shown.

Machine Operations: The crankshaft lathe employed in these studies is a single-spindle, double-center drive, triple-slide lathe for rough and



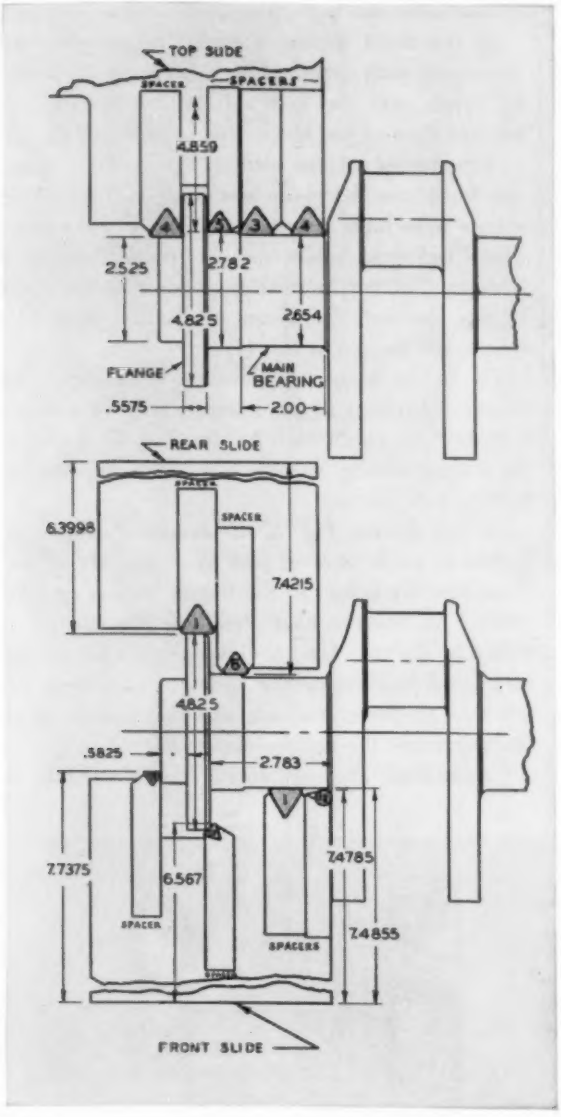


Fig. 7. Above. Present form of tooling employing individual toolholders for standard bits. Precision of holders and gage surface simplifies tool setting.

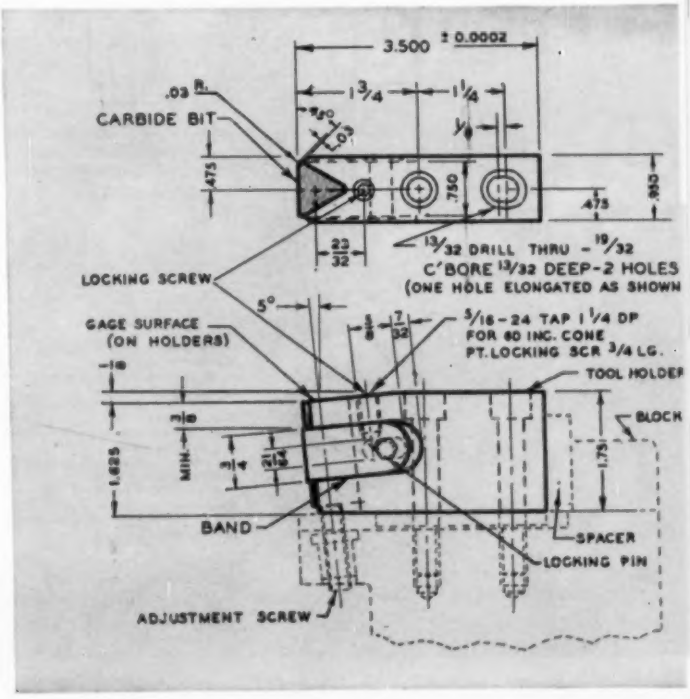
Fig. 8. Right. Detail of precision holder showing clamping method and backup screw in block.

finish turning all five main bearings, flange end and stub end. Hydraulic feed of the slides is independent of the rotation of the workpiece. Slides 1 and 2, or front and back, respectively, work together through a rack and pinion. Slide 3, or top slide, can work independently. Slide 1 carries checking tools. Slide 2 carries the tools for cutting diameters, and slide 3 carries all spacing and filleting tools.

Automatic control of the work cycle is staged as follows: (1) Rapid approach to cutting position. (2) Checking feed, 0.125 ipr. (3) Intermediate feed, 0.035 ipr. (4) Finish turning feed, 0.006 ipr when all tools are engaged in plunge turning. (5) Diameter stop. (6) Tool dwell at finished diameter for 5-6 revolutions to clean up cut. (7) Return to predetermined position for loading and unloading.

Tool Designs: Early tooling for the high-speed steel and brazed carbide tools involved intricate form tools in the slides as shown in *Fig.* 3. The top slide carries grooving tools for recessing each end of each main bearing. These tools were set from trial cuts. In the second tooling method, using carbide tools, jackscrews were incorporated in the tool as shown in *Fig.* 4. With accurate pads welded in the tool blocks, these tools could be preset accurately, saving considerable machine time. With each regrind the tool length was returned to dimension by adjusting the screw.

It was then found that the recessing in the bearing ends could be substituted satisfactorily by filleting as shown in *Fig.* 5. This not only simplified the machining and tool-grinding operations, but



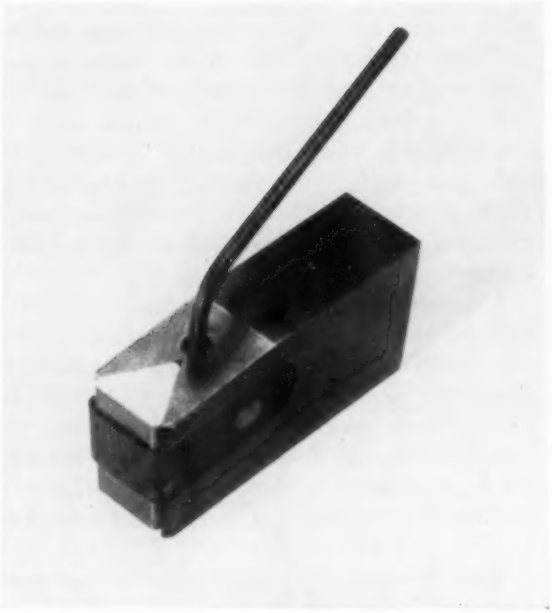


Fig. 2. Precision toolholder. Operator adjusts carbide bit flush with top surface of holder.

also increased tool life and grinds per tool.

In the third tooling method, experiments were conducted with carbide bits held in the toolholders by bands over the body of the insert. The early holders were of the block type, combining as many as five inserts in one holder, *Fig.* 6. Tool spacing was built into the toolholder itself and adjustment screws were built into the lower part of the holder. This block-type holder did not permit minute adjustments, except by raising or lowering the inserts. It was decided, therefore, to change from block type to the single-purpose type.

The holder body was redesigned from a multiple number of inserts in one holder to one or not more than two inserts in each holder, *Fig.* 7. To obtain the proper setting, spacers were built into the supporting tool blocks.

In this design, *Fig.* 8, the holder overall length is held to a tolerance of plus or minus 0.0002 inch. Tolerance for height of the holder is plus or minus 0.001. All holders have the same length and are bolted to the tool blocks. The tool blocks are held in a fixed position on the slides in alignment with the axis of the crankshaft and the spacers in the blocks control the cutting diameter.

Commercial ground inserts are acceptable for

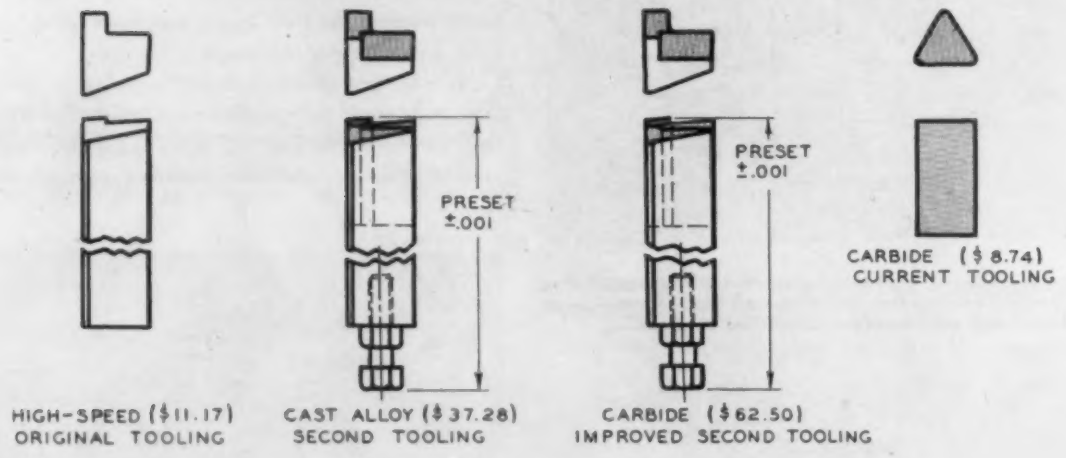


Table 1 — Summary of Three Tooling Methods

	First Tooling	Second Tooling	Third Tooling
Workpiece (material)	Cast Steel	Cast Steel	Precision Casting
Stock Removal (inch)	1/2	1/2	3/16
Tooling (type)	High-speed Steel	Cast Alloy	Carbide Insert
Spindle Speed (rpm)	36	108	139
Cutting Cycle (seconds)	175	60	40
Production* (pieces per hour)	11	19	30
Average Pieces Per Tool	30	170	1500†

*Based on 80 percent efficiency

†1500 pieces per cutting edge (per index) or 9000 pieces per grind

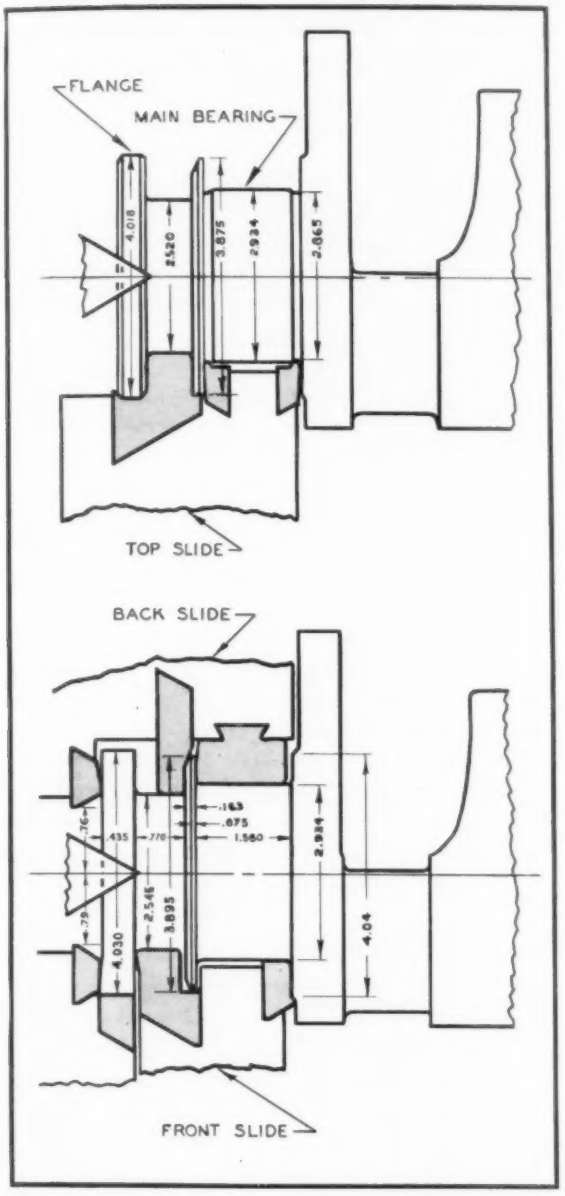


Fig. 3. Original tooling setup employing form tooling. Tools in top slide form a recess at each main bearing.

tolerances on the cheeking, radius forming and chamfering tools. It was found necessary, however, to precision grind inserts for finish turning the line bearings and the stub end. For these operations, a triangular insert is held to plus or minus 0.0005 inch from the flat face to the opposite corner radius and to plus or minus 0.00025 inch on the diameter of the inscribed circle.

This toolholder is especially noteworthy because with it an operator can set his tool accurately to work diameter without additional gaging methods. The top of the holder is a precision surface to which the bit is adjusted flush by feel. Less than 0.001 inch variation between the gage surface and the bit is easily felt with the finger. With the tool cutting 0.025 inch above center on a 2.654 inch diameter and having a negative rake, length tolerance of 0.0004 inch, and bit tolerance of 0.0005 inch, the accumulated effect on the diameter would not be over 0.0001 inch.

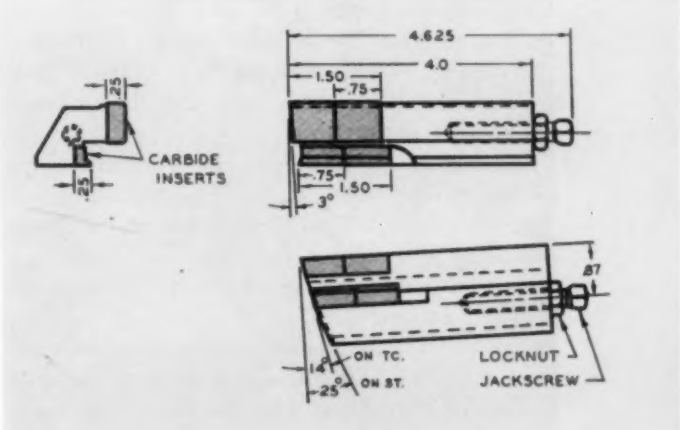
Because the workpiece is precision cast, wear on the tool gage surface is negligible. Most of the wear on the top of the tool is contained within the area of the tool bit. The bits employed are either circular or triangular with the ends ground square, giving at least six cutting edges between grinds. Inasmuch as each edge performs an average of 1500 operations, 9000 crankshafts can be machined before regrinding.

This tool is a modified standard holder, the gage surface, backup screw in the block and precision tolerances being the major differences. In *Fig.* 8, the features for setting this tool are shown. The cone on the locking screw engages a flat on the locking pin holding a thin band so that tightening or loosening the screw also tightens or loosens the band holding the tool bit.

Regarding reductions in tool costs, the solid carbide tool bits are standard shelf items and are considerably less expensive than fabricated form tools. Another advantage includes indexing each bit six or more times, depending on type, before being sent to the grinding room for resharpening. Inasmuch as the life expectancy of the cutting edge is a predetermined number of pieces, reduction of the wear land to a minimum gives more grinds per tool. Another consideration with this type of tooling is the reduction of tool inventory to keep machines in operation.

With the addition of automatic loading and unloading to the machine, it is felt that production rates of 48 shafts an hour at 80 percent production efficiency can be realized.

Fig. 4. Form tool of intermediate design utilizes jackscrew to allow presetting to conserve machine time.

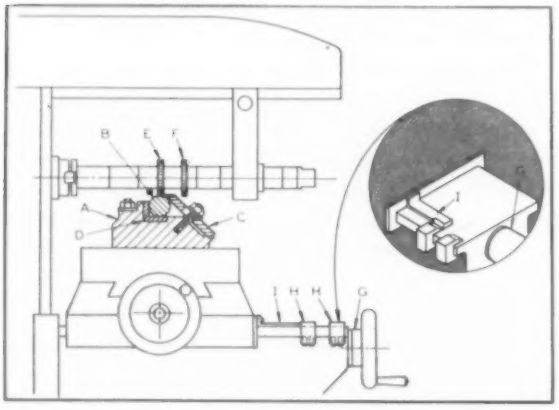


Gadgets

Ingenious Devices And Ideas To Help The Tool Engineer In His Daily Work

Milling Accurate Keyways

A shaft used in a machine required an accurate keyway milled lengthwise. The overall length of the shaft is 25 inches and has a parallel portion of 1½ inches in diameter in the approximate center of its length with a blind-ended keyway running along this central portion for a distance of 15 inches. The tolerances on the keyway are rather tight, 0.001 inch for parellelism with the diameter and for the mean width of 5/16 inch. Depth tolerance is 0.004 inch. The shafts are produced in batches of 50 at one time and the setup for milling them is shown in the sketch.



The fixture body *A* in which the shafts *B* rest is of uniform cross section with clamps *C* spaced at intervals throughout its length. Hardened contact strips *D* are secured to the fixture body and these form a 90-degree V-block lying on its side. This arrangement enables the clamps to be of simple construction and positioned so that they do not interfere with the milling cutters. There are no locating blocks in the base of the fixture for engagement with the T-slots in the table of the horizontal milling machine. The omission of rigid locations of this nature alows the locating faces of the V-block to be aligned accurately with the line of table travel when setting up.

A roughing and a finishing cutter are mounted at the same time upon the milling machine arbor. This arrangement lengthens the life of the finishing cutter *E* which has to remove only 0.020 inch from the width of the keyway when it follows the roughing cutter *F*.

The cutters are brought into position over the work by operating the transverse slide of the milling machine knee and final location is by means of the micrometer dial *G* mounted upon the transverse operating screw. It is possible for the operator to make an error of one complete turn of the operating screw because when he is adjusting the table transversely, the table is lowered so that the work is clear of the cutters.

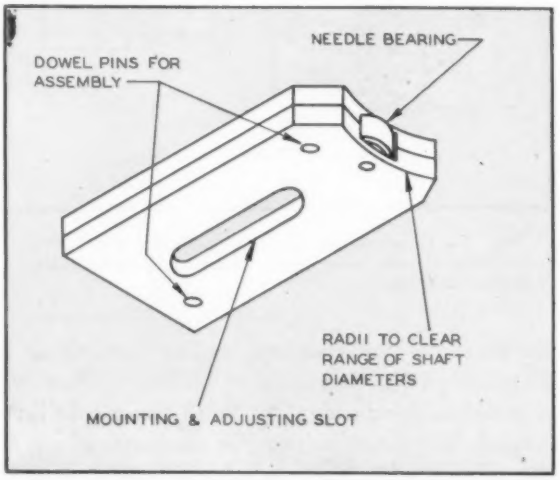
To insure that the chances of error in setting the work under the cutter are reduced, a rough setting device is fixed to the transverse slide of the machine. This comprises two blocks *H* of soft steel which are cut to fit onto the slide. Each block has a centrally placed line which can be aligned with a corresponding mark engraved on an indicating strip *I* clamped to the machine cross slide and and which moves therewith.

In use, the operator aligns the mark on the indicating strip with the line on one of the blocks to obtain the rough setting. His attention can then be transferred to the micrometer dial on the machine screw in order to obtain the final setting.

The only special tooling of any expense in this setup is the V-block fixture and this is used for milling keyways in shafts of other sizes.

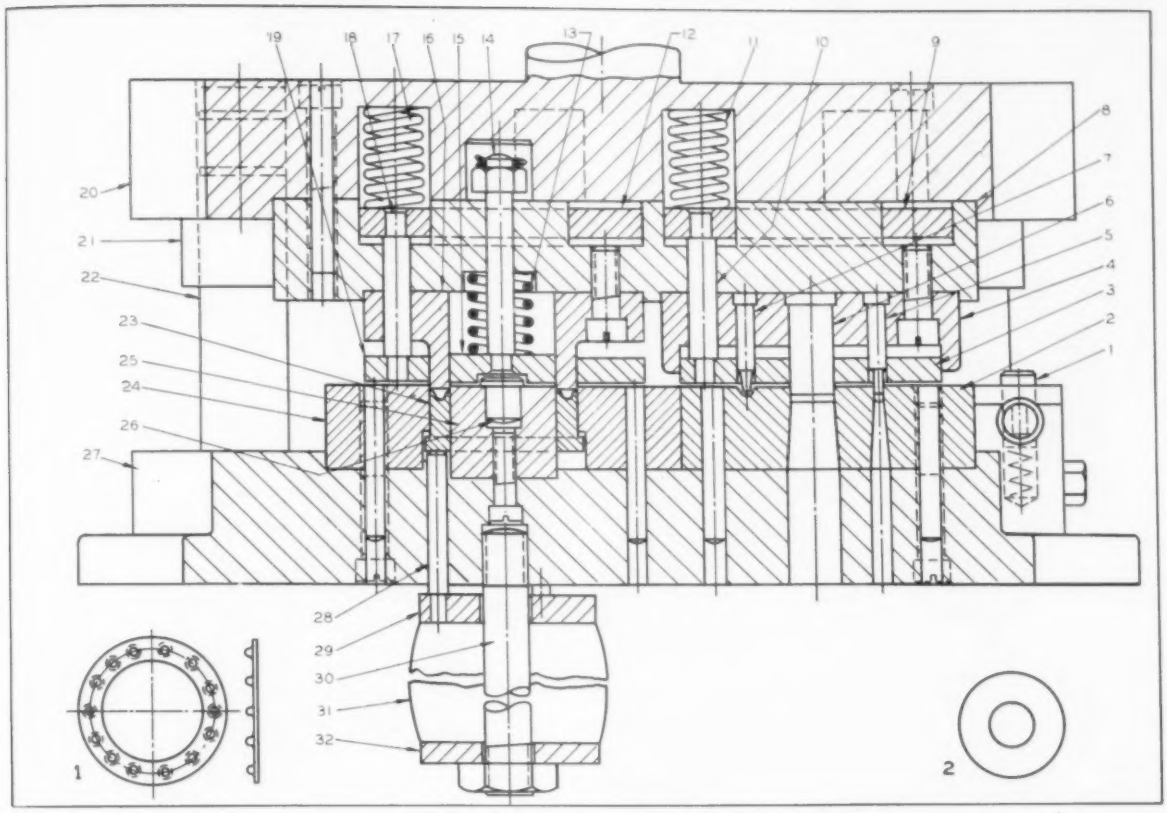
F. E. Riley
London, England

Steady Rest Jaw



A means of eliminating the scarring which often results when a shaft is run in a steady rest jaw is shown in the accompanying sketch. An antifriction bearing is added to the steady rest jaws. Needle bearings are best since they provide more contacts with the work and minimize chatter. Both large and small diameter finished shafts can be accommodated without danger of distortion or scoring.

Dale Orr
Knoxville, Tenn.



Progressive Die

This progressive die produces two parts at two separate stations. The first part is a ring shown at *1* which is blanked from 3/16-inch sheet metal with three small pierced holes in a circle. There are also eleven embossings on the ring, two of which are used to assemble roller bearings for farm machines. The second part, a washer, *2* is stamped from the scrap resulting when the center hole is punched.

The metal strip stock enters the die at the right from a coil. The forward end is registered against the first finger stop and the punches pierce the four holes and the eleven embossing punches produce the embossings. The strip is then moved forward to the second station. The operation at the first station is repeated. At the third station the strip is located by pilot 26 which enters the hole pierced in the first station. The ring and washer are cut out by cutting punch 16 against ring die 24 and die 25. On the upstroke of the press ram, the finished work is ejected from the blanking die 23 by means of the rubber pad 31. The washer is ejected from blanking punch 16 by the shedder 15 by means of the compressed coil spring 13. The two pieces are blown out of the die by air pressure.

Hjalmar Dahl
Upplands Vasby, Sweden

Air Curtain

An air curtain has been added under the aperture of the small furnace as shown in the accompaning illustration to reduce the amount of heat thrown off onto the operator. Although the furnace is exhausted overhead in the conventional manner, the heat from the furnace opening is still uncomfortable since the operator must work close to the furnace.

The air curtain is made by mounting a metal pipe with a series of holes in it directly under the furnace opening. One end of the pipe is closed and the other end is attached to the air supply.

E. Guilbert
Chicago, Ill.

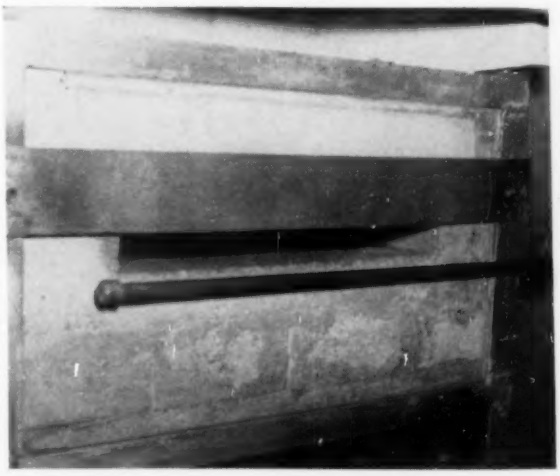


Fig. 1. The optical gaging system provides complete information concerning hole size and location in three minutes as well as a check on all contours of the part.

Optical Gaging Speeds Inspection

By Robert W. Brown

Eastman Kodak Co.
Rochester, N. Y.

OPTICAL GAGING methods have increased the inspection rate of complex ammunition components by several hundred percent, and at the same time provide greater accuracy than was possible with mechanical gaging. The equipment used is shown in *Fig.* 1. The parts to be inspected are small brass plates, approximately 1½ inches in diameter, components of a Naval Ordnance fuse. The critical features of the plates are holes that are punched and drilled to tolerances as close as ± 0.0006 inch on both size and location of the holes.

Inspecting the plates mechanically involves 58 separate gages, *Fig.* 2. The cost of one set of these gages is $6,976. However, three sets are necessary to maintain full production on an eight-hour shift. One set will be undergoing wear inspection or repair, another will be in transit or storage, while the third is in actual use. Second and third shifts require additional sets of these gages.

Wear of the mechanical gages is a continuing problem, and they require frequent checking and repair in order to maintain the required tolerances. The manufacture of this type of gage demands the highest toolmaking skills, and any large orders for such instruments would severely tax the country's toolmaking facilities.

A skilled workman can check one of the brass plates in about eight minutes with these mechanical gages. The information derived from this inspection is of the go and no-go type, which is of little use to the machine setup man in making adjustments to the punch press and drilling machines when rejects are found.

The optical gaging system described here is the result of a project sponsored by the Navy Bureau of Ordnance, Washington, D. C. The original piece to be inspected was a two-plate fuse for which the mechanical gages shown were manufactured. The optical gaging system, however, can be adapted to an eight-plate construction and is, therefore, capable of doing four times as much checking as the mechanical gages.

Limitations of Coordinate Checker

A second method of inspecting the plates is with a master coordinate checker, a precision instrument designed and built especially for this job, *Fig.* 3. With this instrument an inspection can check all hole locations in a plate in an hour, obtaining accurate information on the direction and extent of any deviations. This information is valuable to the setup man, but the master coordinate checker provides no check on the size of the holes, thus requiring the use of mechanical gages for this purpose.

The cost of the master coordinate checker, including a set of special gage blocks, is about half that of the set of mechanical gages. There is no problem of wear with the instrument and it can be used continuously through three shifts.

The optical gaging system developed for this inspection job is shown in *Fig.* 1. The basic instrument is a standard make of contour projector. Each kind of plate to be inspected requires a reticle, a work holder, approximate locator and an indicator plate. The reticle contains an actual size outline of the part and a locating square defining the true location for each hole in a given plate. The reticle with the actual part superimposed on it is projected on the screen and checked against a master chart gage mounted on the screen. The same chart gage can be used for the various plates to be inspected thus simplifying the operation.

An inspector can check a plate completely in about three minutes with this optical gaging setup. Complete information on the size and location of all holes is provided as an accurate guide for the machine setup man in making adjustments to the press and drills. In addition, the projected outline of the part permits inspection of all contours. Unskilled operators can be trained in a few hours to

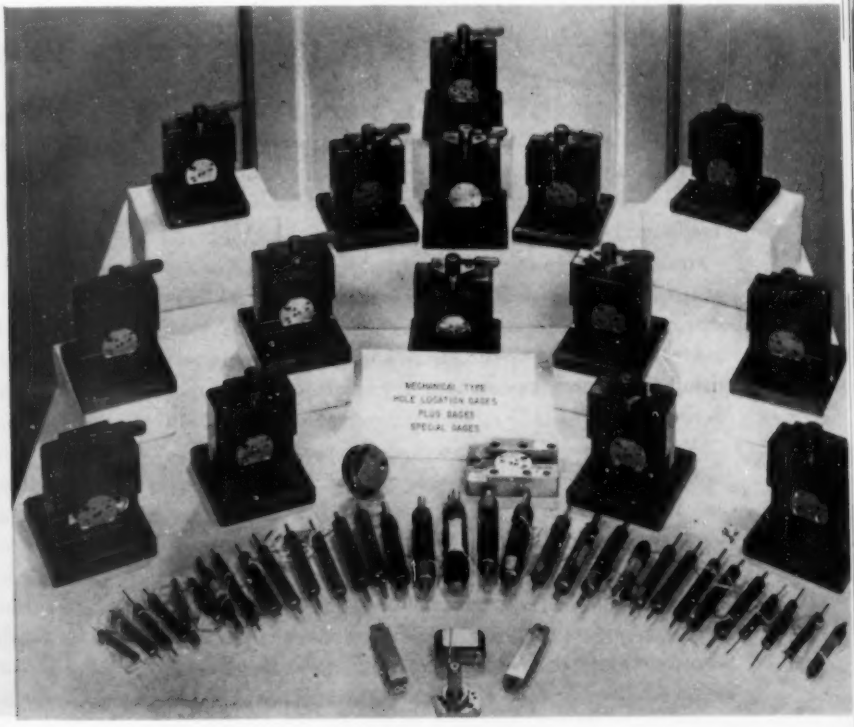


Fig. 2. Mechanical gaging methods for checking these plates require 58 separate gages of the go and no-go type.

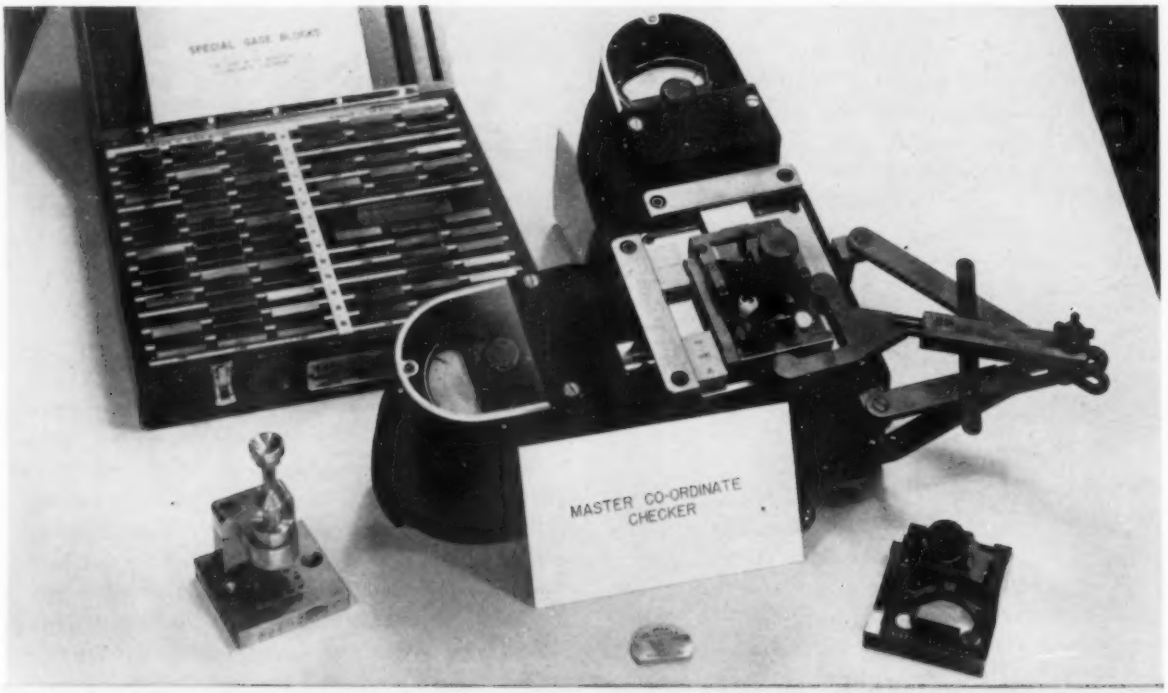


Fig. 3. This master coordinate checker shows the deviations in the positions of the holes in the brass plate but does not check hole size.

satisfactorily operate the equipment.

Cost of the optical gaging equipment, including all necessary fixtures as well as the projector itself, is about twice that of the mechanical gages. The equipment can be used continuously throughout three shifts, and there is no wear problem. The principal part of the system, the contour projector, can also be used on a variety of other parts so that its cost can be spread over many different items.

The chart gage and reticles can be replaced for about 20 or 25 percent of their original cost in case of damage.

Air Pressure and Economy

FOR PRODUCTION ECONOMY relative to portable air tools, study of the effect of low air pressure on cost of operation, particularly from the labor cost standpoint, may hold considerable interest for the engineer responsible.

Low air pressure means simply operating tools at pressures below those for which the tool was designed to give maximum performance. This low air pressure may result from any of three causes: insufficient compressor capacity; inadequate piping; or leakage.

Pneumatic tools are designed to operate at 90 lb air pressure, which has been generally established as standard operating air pressure for maximum performance and maintenance.

If tools are operating at low air pressure, there is no economy in air cost, since it takes longer to perform an operation. This obviously will use approximately the same amount of air at low pressure, as the amount of air that would have been required using the recommended 90 lb pressure. Add to this the lack of economy entailed by the loss of the operator's time during the lengthened work period.

Approached from still another angle, a pneumatic tool loses power and efficiency in direct proportion to the reduction of air pressure. A test, for example, will show that a pneumatic tool which develops 1.03 hp at 90 lb pressure will develop only 0.904 at 80, or 0.708 at 60. Thus dropping the pressure from 90 to 80 lb results in a 12 precent decrease in power output.

The drop in horsepower causes a drop in the tool rpm and work output of the tool. This loss of from 12 to 31 percent in labor output of the tool, although in actual operation as little as 30 percent of the time, can amount to anywhere from $0.48 to more than $1.23 per day per tool. Assuming there are a number of tools in operation, the total loss may be rather substantial.

Fig. 1. Small parts of many shapes and sizes can be handled in bulk for automatic feeding.

Automatic Feeding of Small Parts

By Charles E. Kraus*

President
Kraus Design, Inc.
Rochester, N. Y.

IT IS INCREASINGLY EVIDENT that there are two distinct phases to a tooling program. Process tooling, involving the selection and tooling of units for altering the physical shape or properties of workpieces is often so well accomplished that a major item of manufacturing expense is in the manual handling of the piece parts. This cost is being substantially reduced by the second phase of the tooling program which can be called automation. This phase, while it isn't new, is being applied in more ways and with excellent results in all kinds of manufacturing. Automation has become an all-inclusive word for the elimination of direct labor in handling and transfer equipment, assembly machines, counting and packaging operations as well as automatic loading and unloading of process units.

Because of the variety of automation problems, one specialized portion of handling tooling will be discussed here, that of small workpieces handled in bulk for automatic feeding.

First, of course, the problem must be defined. A specific part is involved. It must be lined up in some definite manner and must be moved to a specific place. It must be positioned, turned, held or timed relative to some other part or mechanism. Each workpiece and each requirement presents questions which may be unique to the application. Methods and mechanisms are available in increasing variety, with new ones constantly being developed. Experience is being gained so rapidly that workpieces considered impractical to handle a year ago have become a routine application today. A designer and manufacturer of such equipment will frequently discourage a certain application, only to find it has been solved by others, often the very customer who posed the problem. The tool engineer must know if the part can be handled, how, or who

*Senior member ASTE Rochester chapter.

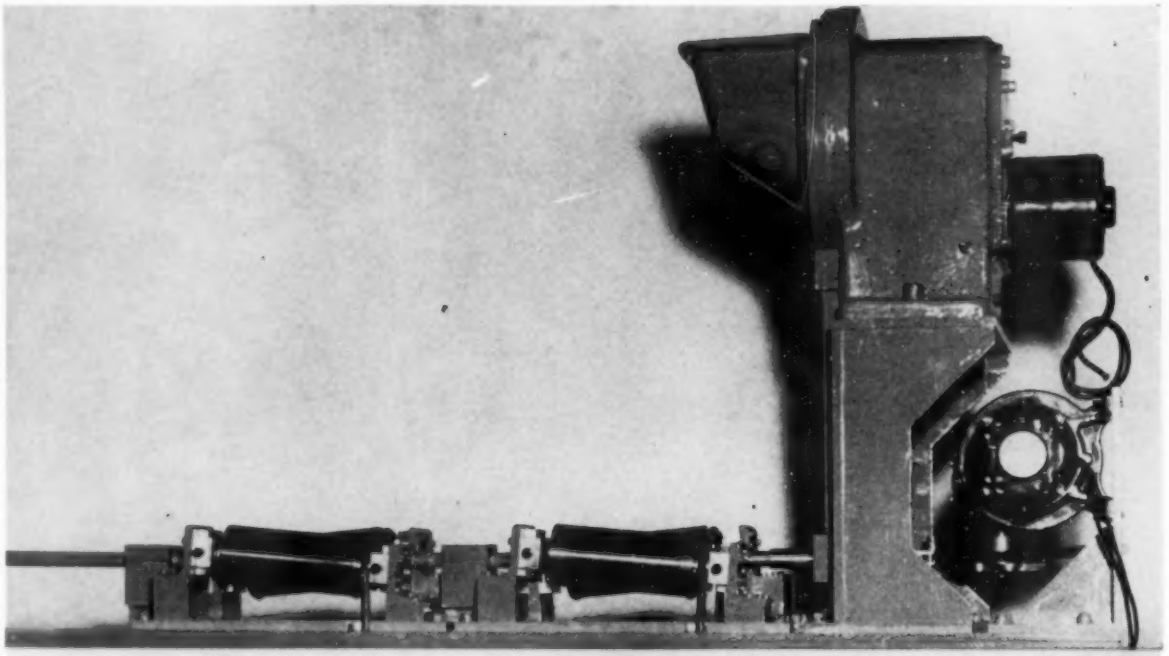


Fig. 2. A stream of small rings is fed to a centerless grinder at an adjustable and consistent rate by means of this arrangement.

can handle it, and there are no easy or general answers.

Because it is easier to point with certainty to workpiece characteristics that have caused difficulties, a few notes of this type should be made. It has been stated that almost any workpiece can be handled automatically by some means, and this is probably true. However, the tool engineer must be realistic. The era of the completely automatic factory is still far in the future, even though it is being approached in a few cases.

Although there appears to be no minimum size, the larger the parts, the larger and more costly the hoppers become. Since some agitation, vibration or tumbling is unavoidable, it is obvious that the part must be of such a nature as not to be harmed by such action. Ceramic pieces, lacquered or highly finished pieces, parts of a fragile nature or which tend to interlock badly, are all difficult and some are considered impractical at the present state of the art.

Parts that leaf or nest together may sometimes cause chuting difficulties inasmuch as they will wedge together when confined by guiding surfaces in chutes or orienting devices. However, there are innumerable parts not damaged by such agitation, stable in shape, uniform from piece to piece, and reasonably free from bad parts, extraneous material such as chips, punchings, etc., which can usually be handled by some means. *Fig.* 1 shows a group of miscellaneous workpieces which have been successfully handled in hoppers; that is, fed, oriented, chuted and positioned. Many such groups of parts could be shown but they obviously would not serve to define any limitations.

The proper orienting of a piece is usually determined by the process unit to be served but often this final orienting is best accomplished at this unit by the inserting mechanism. Some pieces can be conveniently chuted only in a particular orientation, or it may be best to maintain only a partial orientation in the chute, allowing rotation in one

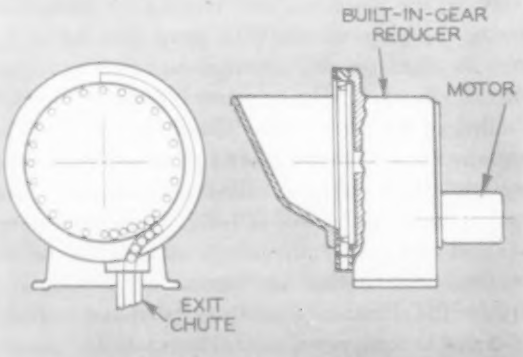


Fig. 3. The hopper of the arrangement for feeding small rings shown in *Fig.* 2 can easily be modified to handle parts whose diameters exceed their lengths.

plane. Very often, then, a piece that is easily lined up one way in the hopper can be used with auxiliary orienting devices either in or adjacent to the hopper for further or altered positioning.

Fig. 2 shows a feeding, orienting, and chuting arrangement for feeding a stream of small rings, at an adjustable and consistent rate, into a centerless grinder. The hopper at the upper right feeds the rings side-by-side to a cammed device which places them end-to-end into the horizontal chute. Hyperboloid rollers, adjustable for rotational speed, control the infeed to the grinder. This unit feeds rings that are approximately one-eighth inch long at the rate of 40 inches or 320 pieces per minute.

The hopper unit of this feeder is shown in the line diagram in *Fig.* 3. It is a simple pin-wheel type having a disk carrying spaced pins which allow parts properly oriented to flow to the exit chute from an annular escape path milled into the hopper housing. End-for-end orientation by shaped pins or milled grooves and numerous modified designs make this simple hopper quite versatile, particularly for parts whose diameters exceed their lengths.

To illustrate the effect of the workpiece on the design of such equipment, *Fig.* 4 shows another feeding unit for a centerless grinder, arranged to handle a variety of cylindrical pieces of different lengths and diameters. The feed-rate controlling wheel is visible and, in this case, the production is 250 inches per minute. Since some of the pieces handled are less than ½ inch in length, upwards of 500 pieces per minute can be fed. Four such units feeding a group of grinders are saving direct labor at a rate of 4,000 hours per year.

One other illustration, *Fig.* 5, indicates how such units can be set up for feeding second operation screw machines or other processing units normally arranged for chute feed. In this case, three feeders are in use in a small screw machine shop and show a direct labor saving on a three-shift basis of 48 hours per day, and a 10-percent increase in production.

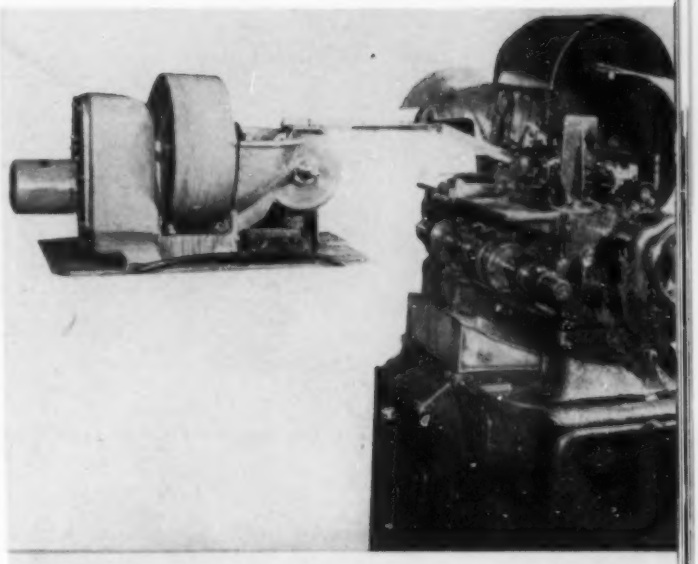


Fig. 5. Automatic feed units can be adapted for feeding second operation screw machines or other processing units normally arranged for chute feeds.

Figs. 4 and 5 illustrate applications of a tumble-type hopper. In its simplest form this hopper is shown diagrammatically in *Fig.* 6. Workpieces in the tumble drum are carried by vanes or buckets to the top and dropped onto various chuting arrangements which orient the pieces and allow correctly aligned pieces to flow out an exit chute. This type of hopper is capable of handling a great variety of workpieces since orienting devices designed for the specific workpiece can be built into the basic unit. Both units shown in Figs. 4 and 5 make use of such special devices. The principle em-

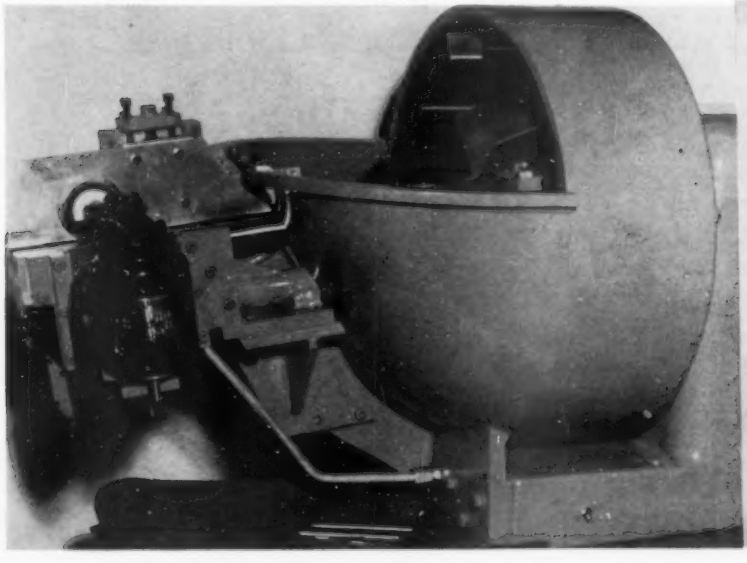


Fig. 4. Cylindrical pieces of different lengths anl diameters are fed to a centerless grinder at the rate of 250 inches per minute by this unit.

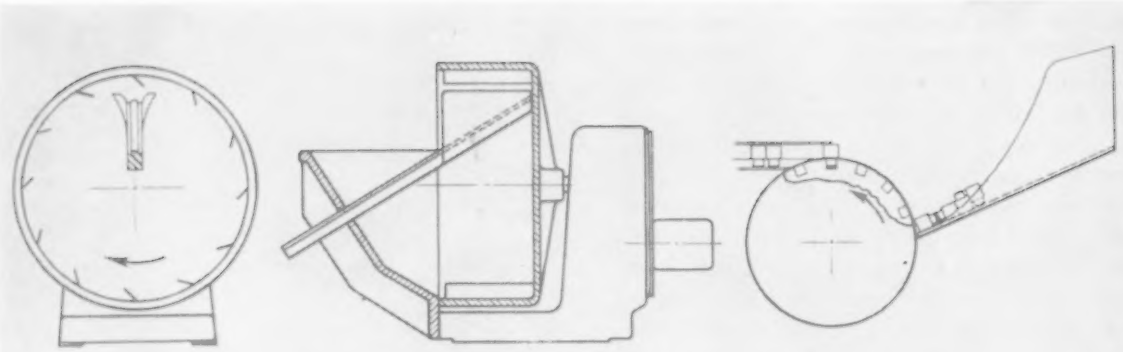


Fig. 6. This is the simplest type of tumble hopper. Orienting devices can be built in to handle a variety of workpieces.

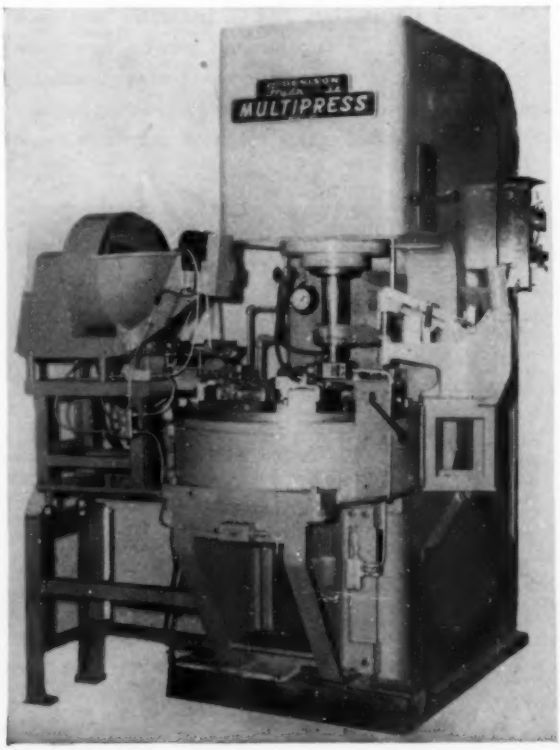
ployed in the feeder in Fig. 5 is shown at the bottom of *Fig.* 6. Pieces, falling on the collecting chute, slide to a rotating wheel with peripheral holes, those properly positioned are picked up, others are sloughed off and returned to the drum for recirculation. In this case the exit chute is used to pick off the pieces being carried up by the wheel and suitable guides and cross section maintain the orientation. The drive to the pickup wheel is through a friction device so that, with a full chute, a pressure is maintained on the workpieces to insure movement and proper injection into the machine being fed.

Fig. 7 shows another completely automatic second operation processing unit. The workpiece, a screw machine product, is fed with an initial orientation from the hopper. A leaf-type inserter that is timed by the press then turns the part through 90 degrees and places it in a fixture of the index table, where a heavy forming operation and a stamping operation precede the automatic ejection. Completely interlocked, the machine will run without attention and shut off in case of faulty piece parts or jams.

These illustrations show tooling for very simple workpieces, but as can be seen from *Fig.* 1, not all pieces need to be so simple. Unfortunately, the more unusual the workpiece, the less in general can be seen from a photograph of the equipment. Frequently, also, the manufacturer of the tooling is not at liberty to disclose how pieces are handled.

Fig. 7. This completely automatic second operation processing unit will run without attention and will shut off in case of faulty parts or a jam.

When confronted by a feeding problem, particularly with small hard-to-handle pieces, it is often possible by minor redesign of the pieces, to simplify the required handling equipment. This is usually true where they can be made symmetrical with no loss of function, or where extra notches or projections can be added for orienting purposes. More and more recognition is given to the fact that product design, process tooling and handling tooling, should all work together and cooperate from the very inception of a project, towards the ultimate goal of low-cost, trouble-free production and high-quality, trouble-free service.



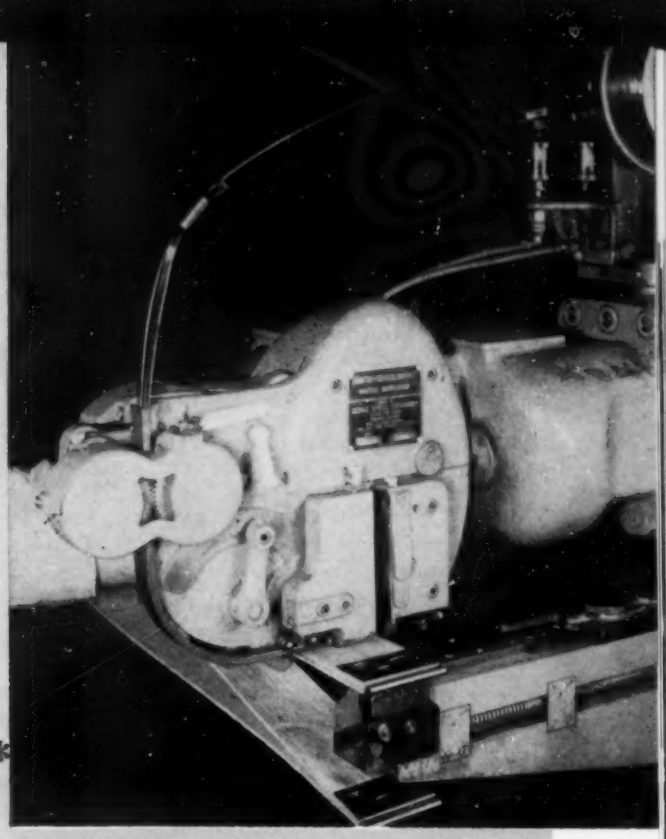


Fig. 1. Assembly of this structural unit proved feasible only with metal stitching.

Metal Stitching Applications*

By Arthur G. Denne
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METAL STITCHING is one of the newer methods of fastening thin gage metals and other materials now available to the design engineer. Characteristic of the process is the high volume rate possible as well as its simplicity and economy. Production increases up to 700 percent and material savings up to 95 percent have been achieved and, in some cases, the elimination of operations requiring skilled labor has been possible.

Metal stitching may be defined as the process of joining a piece of thin-section metal to one or more pieces of other thin material, either metallic or nonmetallic, with wire stitches. Stitching is differentiated from stapling in that stapling uses preformed fasteners or staples, while stitching cuts wire from a coil to suitable length and forms each fastener or stitch as the joint is made. The machines for this process are of two types, one of which produces a loop clinch while the other makes a flat clinch, *Fig.* 1. Speed of operation is from 80 to 100 stitches per minute.† Shown in *Fig.* 2 are some of the more common sheet metal sections which can be stitched.

Standard Applications: To illustrate the possibilities of this method for joining thin sections, a number of practical applications will be discussed. A company manufacturing sifter sieve frames achieved a 75 percent time reduction by incorporating metal stitching machines in the assembly line as shown in *Fig.* 3. Under the old method of hand operations, it took 44 minutes to attach metal guard strips to the frame board. The new method requires only 11 minutes for the operation.

Each sieve frame is made up of 14 boards, 11 of which requires a metal lining of 28-gage galvanized sheet to cut down wear from abrasive action during the sifting operation. These sheets were formerly attached to the boards with forty ½-inch flat-head nails, requiring prick-punching 40 holes and hammering the nails by hand. Under the new procedure, after the sheet metal is positioned, 30 stitches of 20-gage round wire secure the steel to the wood at a rate of approximately one minute per board.

*Abstracted from the paper, "Manufacturing Applications of Metal Stitching," to be presented before the ASTE Annual Meeting, Detroit, March, 1953. Complete copies of this paper (21T11) may be obtained from Society headquarters after presentation.

†For a complete discussion of metal stitching techniques and equipment, see THE TOOL ENGINEER, November and December, 1951.

Substantial savings were made by replacing drive screws with metal stitches in the assembly of air heaters, *Fig.* 4. Quality of the product has been improved, and fastener costs and assembly times reduced. Thirty-two sheet metal drive screws driven by hand were formerly used to join the heater elements. Now, the same number of wire stitches are driven at high speed with a metal stitching machine. Fastener costs are now $0.33 per hundred units in comparison with the former cost of $7.87. Assembly time has been cut 3½ man-hours per day.

To eliminate a problem of rusting caused by burning the galvanized coating during welding operations, metal stitching has been adapted for the fabrication of a sheet metal frame unit as shown in *Fig.* 5. In addition to eliminating the rust problem, production was increased more than 35 percent or from 400 to 550 units per day.

Another company, which has developed a new structural unit, found that metal stitching was the only satisfactory method of fabricating. The unit is a lightweight, high-strength, structurally rigid laminated plywood roof support.

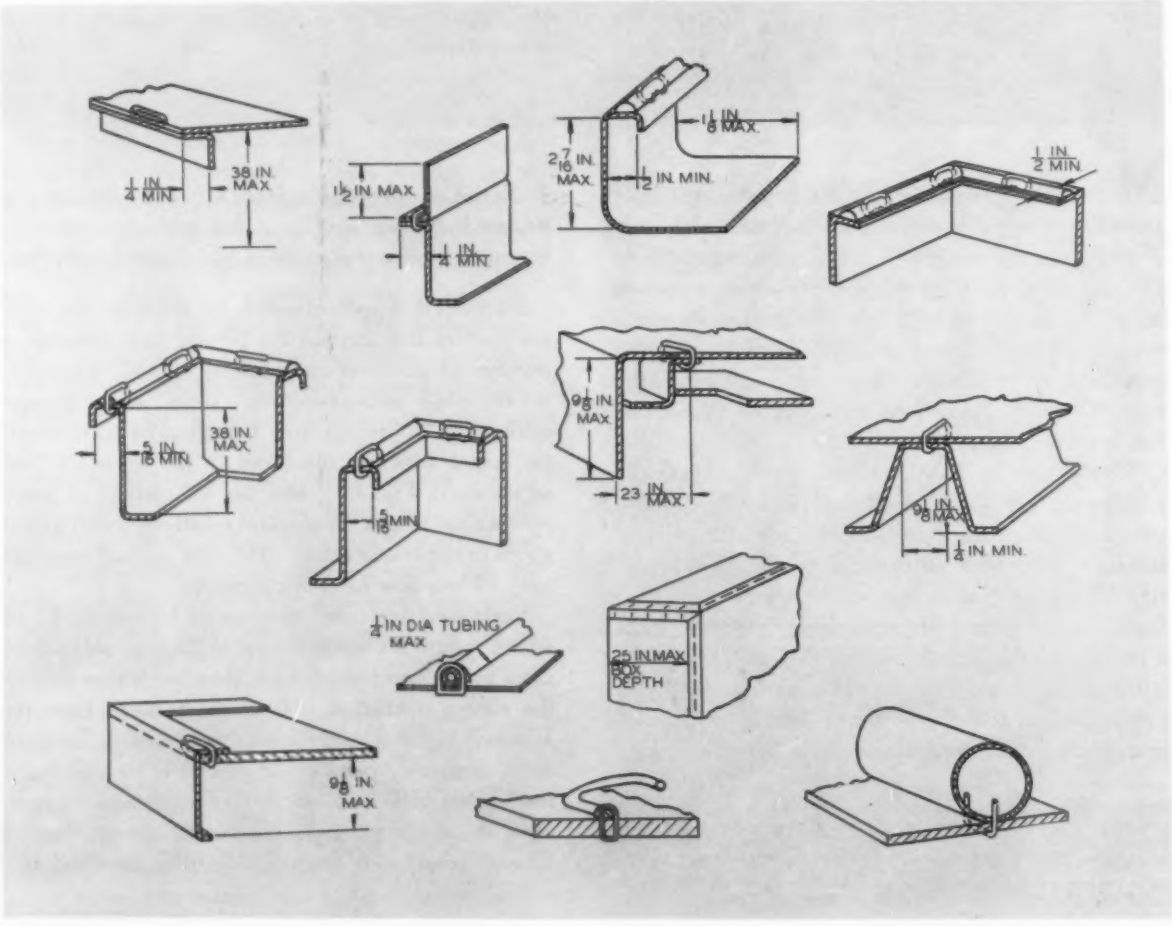
In first experiments, the company used both bolts and rivets to fasten the units together and to attach the end hardware. These methods, however, proved slow and expensive. Gluing, mechanical clips and glued Fiberglas tape were all found unsatisfactory for reasons of either strength or economy.

The unit is now assembled by metal stitching. Midpoints are joined with wire stitches which penetrate first through a U-shaped enclosing piece of steel strapping, through two thicknesses of the three-ply red oak plywood, and then through the bottom piece of steel strapping, after which the stitches are clinched. The female hardware at the ends of each set of plywood slats is fastened with three wire stitches in the same manner, *Fig.* 1. Each unit is assembled with 120 wire stitches. Total stitch penetration is 0.07 inch of metal and 0.375 inch of wood.

Without production setups, production time per unit is 30 minutes. Better fixtures and slight modifications of the stitcher promise to cut five to ten minutes from this time when the rate is increased. Exhaustive tests have proved that the unit will not fail through separation at midpoints or ends.

Special Applications: The cases cited so far have been regular manufacturing applications of the metal stitcher. In other instances, the process

Fig. 2. Typical sheet metal sections which can be joined by wire stitching.



is able to solve problems posed by unique conditions or unusual workpieces because of size, shape, material or assembly demands. Following are a few examples of this type.

RETAINING CLIP: A manufacturer of small electrical tools formerly tied knots in the wire or used a hog ring to prevent terminal connections inside the tool from being pulled out, thus causing short circuits. Now used is a strain relief clip of flat galvanized wire formed on a wire stitching machine. This retaining clip is substantially less costly than the hog rings and the extra amount of cord required to form a knot. The formation of the retaining clips by stitching is also considerably faster.

ELECTRONIC SWITCH: A combination switch and variable resistor required the use of a stitcher for assembly of a Bakelite housing to a stamped metal cap. Stitching was selected as the fastening method because of the low material cost and also because the many small parts in the completed unit left insufficient room in which to fit any other type of fastener.

The most difficult problems which had to be solved were the accurate alignment of the slots in the Bakelite housing and holes in the metal cap with the stitch legs, and the clinching of the legs on a very small radius. It was also necessary to furnish a nonrepeat electric trip actuated by a precision switch which in turn was operated by the work-holding fixture. Another problem was the placement of the stitch crown in a slot below the surface of the Bakelite housing which necessitated removing the shoe.

The clincher is mounted on a slide which is in position for loading. The top of the clincher has a recess to accommodate a projection on the bottom of the metal cap. The housing has two 0.086-inch diameter $\frac{1}{32}$-inch high dimples on the underside which fit into two 0.090-inch diameter holes in the metal cap. These preassembled parts are placed on the clincher, *Fig.* 6, so that the legs of the metal cap locate on the two pins projecting radially from the lower part of the clincher.

As the slide is pushed under the stitcher head, two spring-loaded plungers are cammed from the side. Tapered edges and wire grooves have been placed in the ends of the plungers and each performs a separate function. The tapered edges locate the bell mouth wire grooves, in the sides of the housing, directly under the stitch legs. The wire grooves in the plungers and the wire grooves in the housing function as a unit to support the stitch legs.

When the slide is pushed to the rear as far as it will go, it contacts the precision switch which actuates the electric trip, causing one stitch to be driven.

Fig. 3. Stitching metal guard strips to frame boards for a sieve assembly.

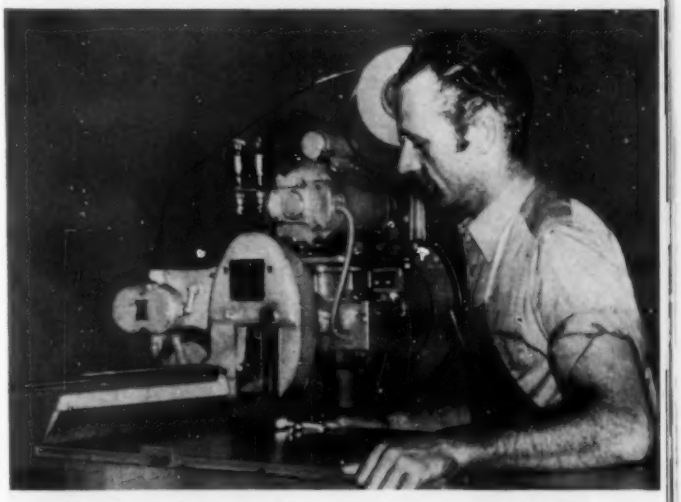


Fig. 4. Thirty-two drive screws were replaced in this operation on an air heater unit.

Fig. 5. Wire stitching eliminated a rust problem in fabricating this sheet metal unit. When the sections were welded, the heat burned off the galvanized coating.

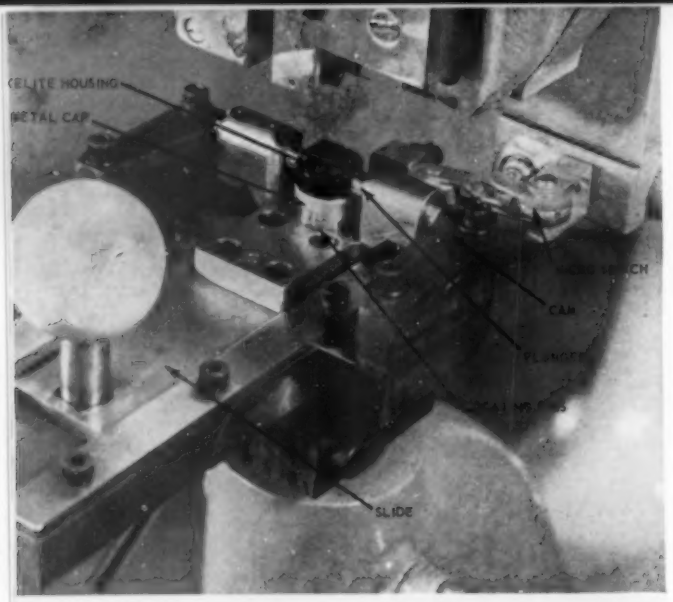


Fig. 6. Parts of an electronic switch in stitching position.

The clearances inside the metal cap are so limited that the bottom of the loop clinch cannot project more than 0.015 inch below the surface. The small radius on the clincher required to obtain the clinch caused an excessive amount of resistance to the square cut ends of the wire, *Fig.* 7. This resistance caused the unsupported crown to buckle. The chisel cutoff obtained with the redesigned beveled knife conformed more closely to the clincher profile than did the square cut. The reduction in resistance was sufficient to overcome the buckling of the stitch crown.

The entire fixture is mounted on a spindle which can be raised or lowered to obtain the proper compression. The amount of compression is critical since too little will cause a loose stitch and too much will cause the driver end to crack the housing.

TIRE BEADS: A modified metal stitching machine in use at a rubber company permits the production of higher quality tire beads at a lower cost. Tire beads are made by winding a continuous length of rubber-covered high-tensile wire in layers to form a loop.

Formerly, the overlap point of the bead was hand tabbed with a rubber-coated fabric tape. The speed and quality of this operation depended a great deal on the skill of the individual operator. Now the joint is made quickly and is held securely by two stitches applied with a stitcher.

It was necessary to develop stitch crowns having widths of 0.147, 0.187, 0.227, 0.267, 0.337, and 0.350 inch between the insides of the legs to accommodate the various widths of beads. Because of the different thicknesses of beads, it was necessary to furnish four different lengths of drivers to accommodate these variations.

On flat work, the formers clamp the material to the clincher while the stitch is driven and clinched. On this application, the stitch does not penetrate but is wrapped around the bead, requiring special tooling. A unit was designed to perform the combined function of a clincher and work-holding fixture.

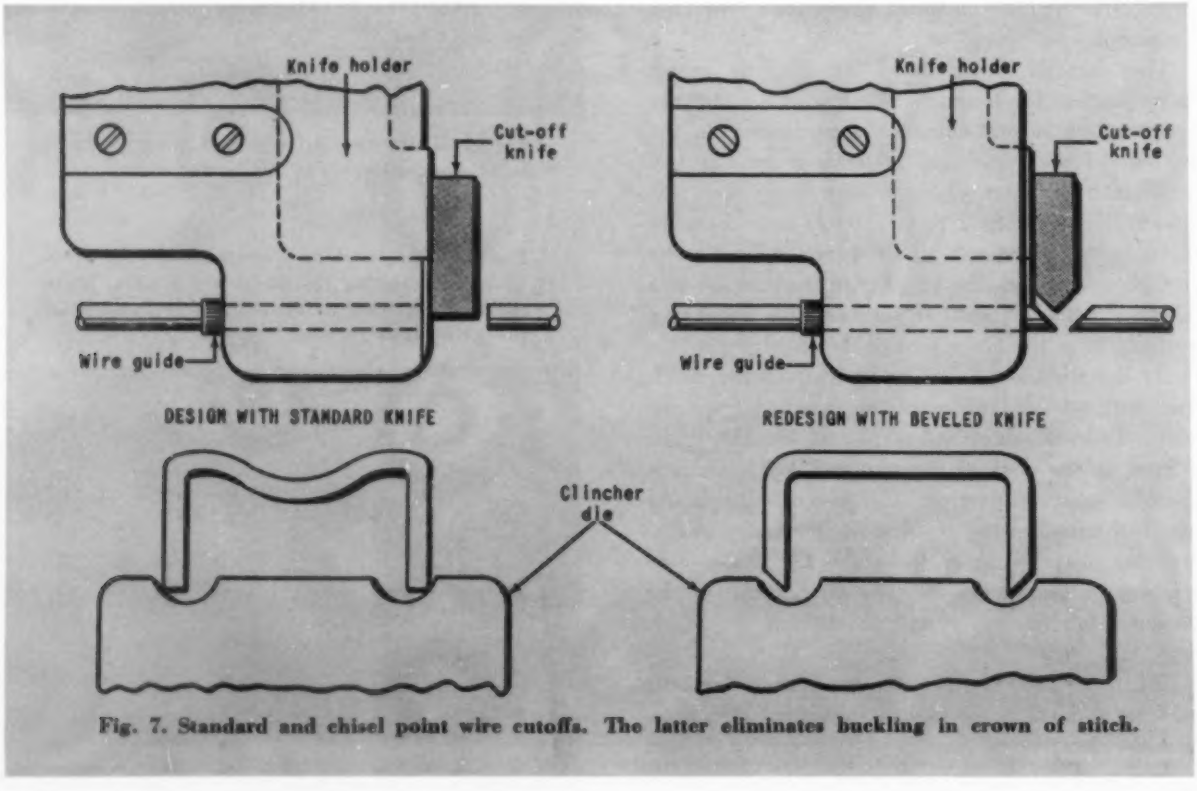


Fig. 7. Standard and chisel point wire cutoffs. The latter eliminates buckling in crown of stitch.

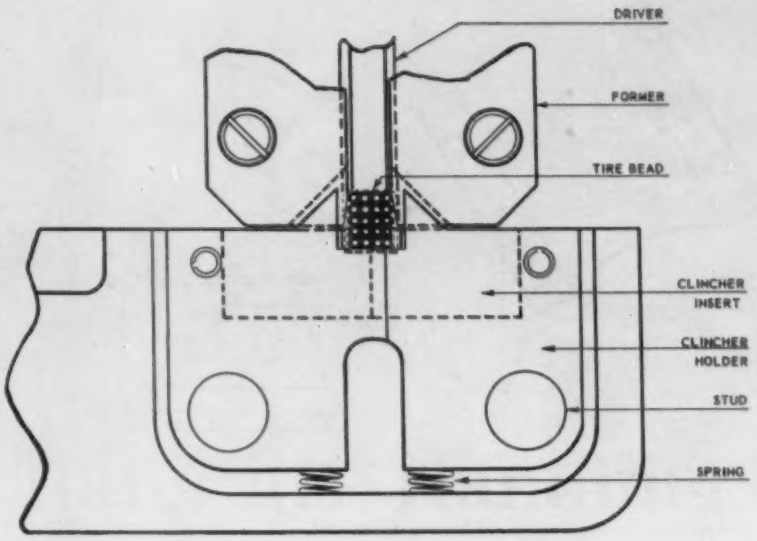


Fig. 8. Tire bead clincher assembly in the closed position.

The clincher holders pivot on a stud and are kept in on open position by two springs. The clincher inserts are mounted in the clincher holders.

When a bead is placed in the clincher, the uprising points of the clincher holders act as a guide in locating the bead in the proper stitching position. The lower ends of the formers are relieved slightly at the points that fit over the bead to prevent interference with and damage to the bead. As the formers press on the top surface of the clincher holders and cause them to close, the clincher inserts compress the sides of the bead, *Fig.* 8.

The clincher inserts have wire grooves which line up with the wire grooves in the formers. The vertical sections of the clincher inserts which contact the bead are tapered from the outside edges to the wire grooves. This enables them to dig into the rubber coating of the bead and contact the wire core. When the leg of the stitch is driven through the rubber, it is supported by the clincher and wire core, insuring a tight fit around the bead.

On a standard straight arm the clincher is mounted at the end of the arm. A special arm is used so that the clincher can be mounted from the side and yet be located under the centerline of the stitch, *Fig.* 9. This provides clearance for the bead, which must be held parallel to the arm in order to place the crown of the stitch across the width of the bead.

The company found that by replacing the two tape tabs on each bead with two stitches, the matreial saving is 92 percent, or $1.90 per thousand beads. Labor costs, approximately $6.00 per thousand beads with the old taping method, have been reduced to $3.00 per thousand. Also, because the stitching operation is faster, scrap losses have been eliminated, since beads coming from the winder no longer have to wait at the tabbing operation.

Loading Coil: Another application for metal stitching is the assembly of two parts of a small loading coil. One part is a terminal strip and the other is a metal can in which the terminal strip is enclosed. The terminal strip is made of waxed fibreboard into which ten ¼-inch crown stitches are driven along each of two edges, *Fig.* 10. Special activated clinchers were designed so that one leg is clinched flat while the other is unclinched and projects upward at right angles with the board.

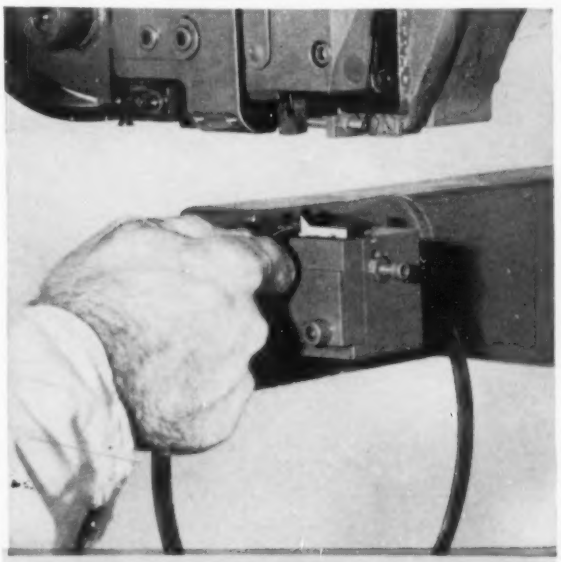


Fig. 9. Offset arm permits the clincher to be mounted from the side and yet be under the centerline of the stitch.

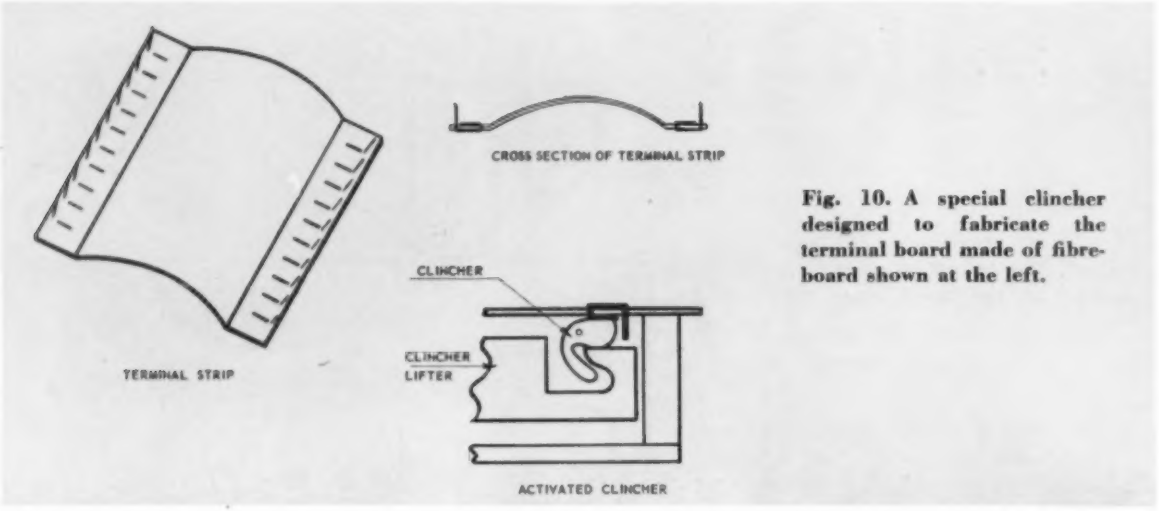


Fig. 10. A special clincher designed to fabricate the terminal board made of fibreboard shown at the left.

This projection is used as a soldering terminal.

Originally a single-head stitcher was used on the job, but it was slow and the stitches were never located directly opposite each other. This unit was replaced by a double-head stitcher which drives two stitches at once. An indexing device which automatically advances the work to the next stitching position was built and attached to the stitcher.

The terminal strip and other component parts are inserted in a metal can which is slotted along the side. This permits the soldering terminals to project outside the container. An inverted end cap is inserted into the bottom end of the can and stitched in place with three $\frac{1}{4}$-inch crown stitches, *Fig.* 11.

The small radius of the metal can presented two problems. The use of a standard flat surface clincher and a standard $\frac{7}{16}$-inch crown would have caused the sidewall of the can to be flattened at the stitching point. To prevent this deformation, a $\frac{1}{4}$-inch crown was used and a clincher was developed with a radius conforming to that of the sidewall of the can. The $\frac{1}{4}$-inch crown and a very short leg length made it necessary to reduce the minimum amount of wire draw. This was accomplished by a change in the wire draw linkage.

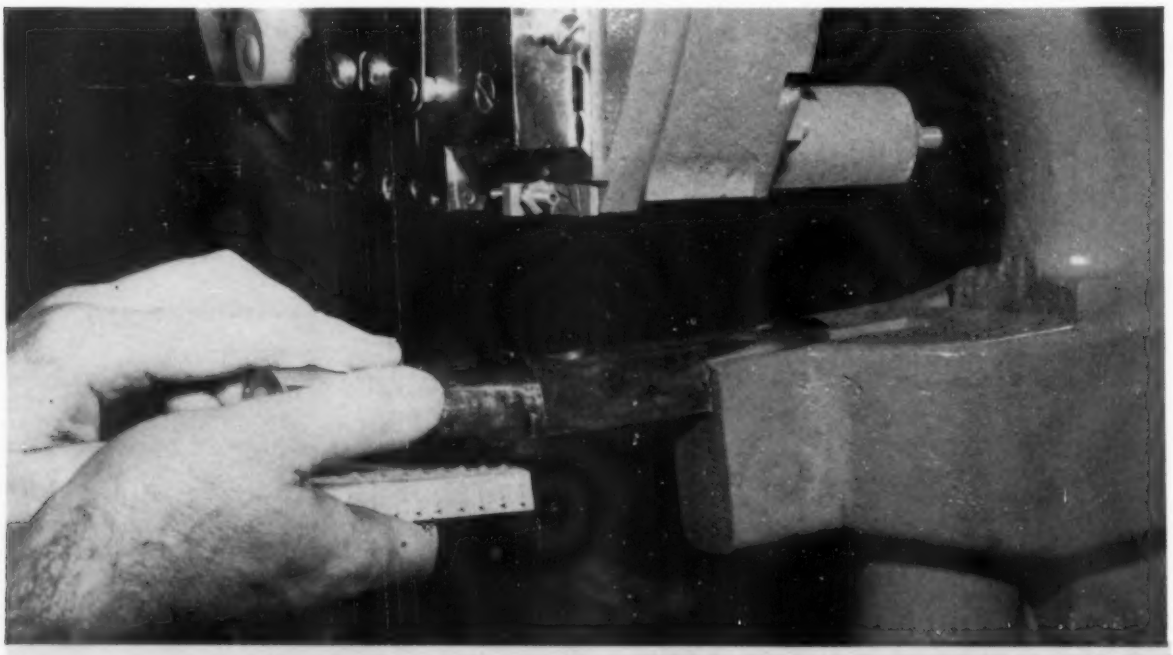


Fig. 11. Special tooling developed to stitch the end cap in this loading coil.

Engineered Fastening for Reduced Materials Handling

By Laurence H. Flora

Director of Engineering

Tinnerman Products, Inc.

MORE THAN EVER BEFORE industry is coming to realize the vital role played by fasteners in the manufacture of any assembled product. Savings can be achieved by specifying the proper fastener, and cost-conscious production men are taking a second look at fastening methods.

It has been proved often that a properly designed fastener can provide substantial cost reduction, even though the unit price might be higher than that for an alternative device. This is particularly true where the fastener is designed to perform multiple functions and replaces two or more parts in application on the assembly.

Because of developments in the design and application of fasteners, the engineer must keep abreast of new and improved manufacturing methods. He must acquaint himself with new materials and processes such as alloys, plastics, fabrics and wood products and their characteristics.

Thermal plastics, for instance, have a tendency to flow or to take cold sets. Fastening problems resulting from these conditions require a fresh approach in fastening techniques, *Figs.* 1, 2 and 3. New manufacturing procedures, improved assembly and tooling methods must also be kept in mind so that the best fastener for the product may be employed and a reduction in manufacturing costs obtained. Problems like the following are a challenge to the designer and provide an excellent opportunity to prove the value of engineered fastenings, in providing substantial savings in time, material and labor.

A manufacturer of quality desk calenders, for example, was using six parts to fasten the calendar pad retaining rings in place. This involved handling each part separately, properly locating it and driving two screws, thus creating a problem of excessive handling and high cost of materials.

A complete calendar unit was analyzed for application of all component parts. First consideration was given to tooling relative to the plastic mold used because die changes were to be held to a minimum. It was necessary to develop a fastening method that would do the job with virtually the same base and pad-retaining ring. The fastener must incorporate resiliency, spring tension and positive locking.

The fastener designed for this application incorporated a simple, self-retaining device which eliminated two screws and two nuts. By providing two spring fingers on the base of the fastener and the correct amount of resiliency, two more parts, a flat spring and a pressure plate, were unnecessary. One fastener replaced six separate pieces, *Fig.* 4.

A multiple-function fastener can defeat itself at the start if it displeases the man on the assembly line. Serious attention must be given to design whenever special installation tools are required. Detailed development of a fastener and its applica-

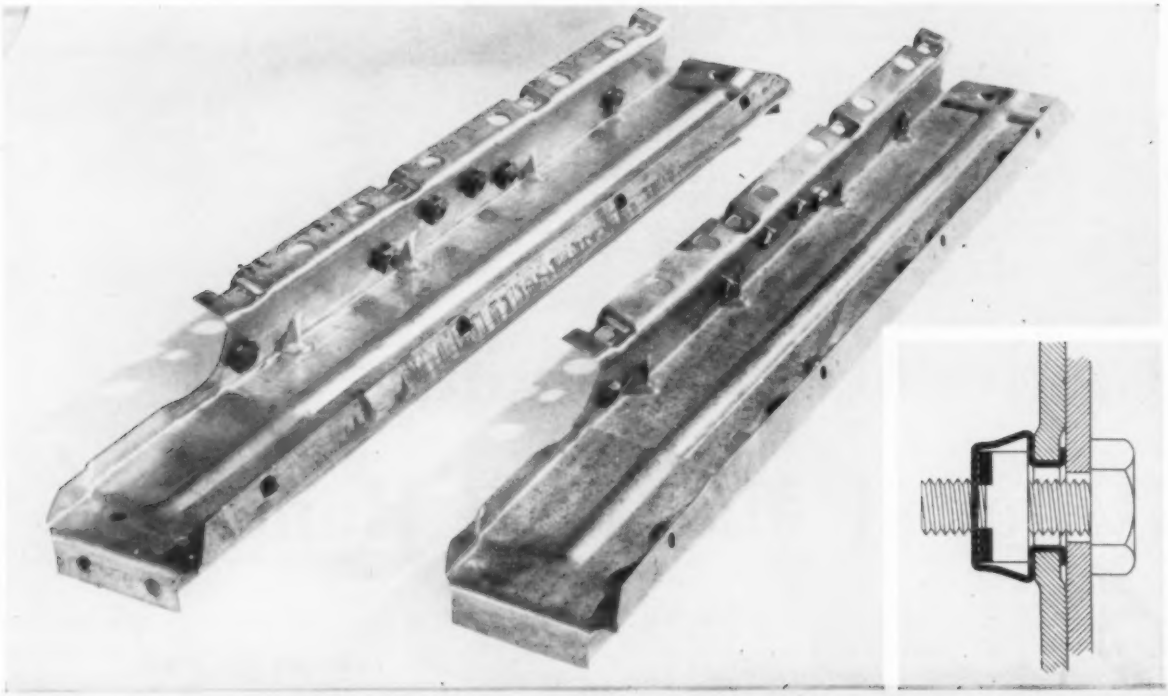


Fig. 1. This fastener is designed for retaining square nuts in blind locations and can be snapped on by hand. On radiator part at left these fasteners have replaced weld units at right.

tion in assembly effects worthwhile economies in tooling and die design when preparing for production.

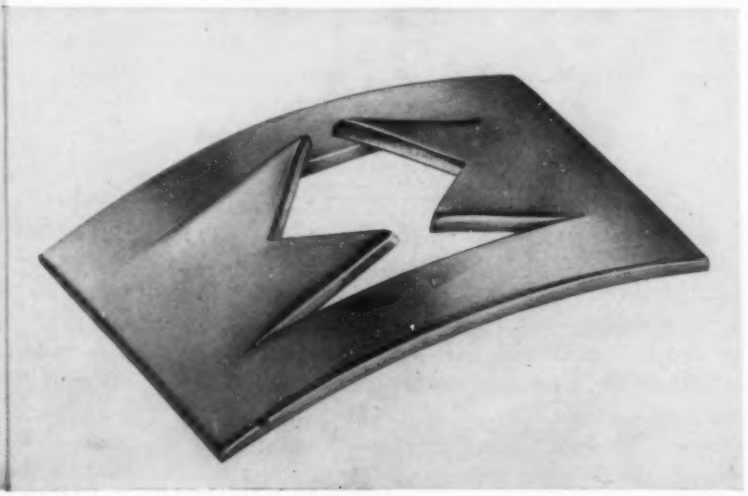
The worthiness of engineered fastenings and the careful planning that goes into their creation is borne out in the report received from the desk calendar manufacturer, ". . . 32 percent savings in assembly time and 56 percent savings in material. . . ."

During the last war, the aircraft industry recognized the importance of efficient fastening methods. With thousands of attachments being made on a single airplane, any saving that could be made on a fastening method was worthwhile considering the production involved.

Standards engineers were given the job of selecting efficient fastening methods and establishing them as standards. Purchasing departments were then able to purchase fasteners in greater quantities. Through standardization, fewer parts were stocked, handled and inspected, all of which permitted increasing production quotas without detracting from the aircraft quality.

Fastening problems facing the aircraft industry were thoroughly studied and multiple-function fasteners were created. They were designed to fill

Fig. 2. Push-on type of fastener can be zipped over unthreaded die cast or plastic studs, rivets, nails, tubing or wire to lock parts.



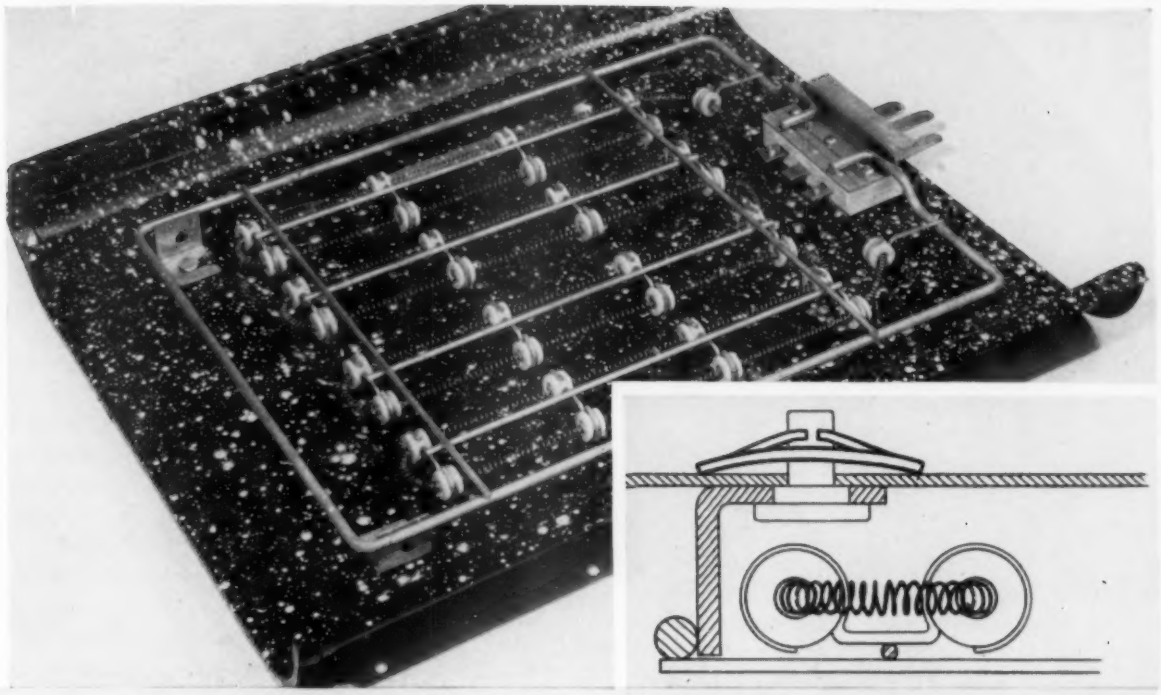


Fig. 3. Use of the fastener as shown at lower right to secure the oven filaments supports in an electric range resulted in a 77 percent savings.

fastening needs on diverse applications, which resulted in a minimum of tooling.

One of the more outstanding examples of this program at work is an electrical harness clamp for universal use in the aircraft industry. It had been a common practice to install harnesses with standard AN742 clamps using a screw and nut for attachment. Removing or replacing single wires or bundles required removing the screw and nut.

The selected clamp was so designed that the harness was secured by wrapping the cushioned clamp around it and locking it with a patented latching feature. Service became a simple matter; unlatch and remove the wires or harness and replace them, then latch closed again.

The clamp could be installed either on bulkheads within the ship prior to harness installation or on the make-up boards as the harnesses were gathered. The mounting screw was required only in securing the clamp to the plane interior and was not touched in service.

With more than 10,000 clamps on the larger bombers, this feature provides tremendous savings in man-hours, both in the aircraft plants and at the modification depots. Cost analyses conducted by one of the larger aircraft companies showed a savings of 18 cents per clamp, amounting to $67,500 on the contract surveyed.

Tooling for production can amount to millions of dollars in America's larger companies. The automotive industry invests hundreds of millions of dollars in tooling for major model changes. With these tremendous costs in mind, the fastening engineer must design his product to reduce these costs wherever possible.

A fastener which has done a great deal in this respect is self-locking, self-retaining and vibration-proof, and can be snapped in place by hand. Applied over panel edges or in center panel locations, it is ideal for blind assembly locations or hard-to-get-at locations.

These fasteners were designed to eliminate the necessity of welding, staking and clinching. The fasteners are snapped into the panel holes by hand, no special tools being required. Mechanical fingers hold them securely in place; they cannot fall free or turn in the mounting holes, yet they can be easily removed if servicing requires it.

The savings are immediately evident. Necessity for investment in capital equipment, such as welders or clinchers is eliminated. Skilled or semi-skilled labor can be released for other duties. There is no retapping of threads to remove welding flash. Paint cannot clog them and they will not freeze in the threads.

A variation currently used in large quantities contains a tough fiber washer for thread-locking adjustment. It is used on a headlamp adjusting brack-

Fig. 4. Two nuts, two screws, a flat spring and a pressure plate were replaced by one fastener in the assembly of this desk calendar base.

et and provides prevailing torque at any point of adjustment with car-life-long performance. It has been adopted because it provides lower price and better performance than other fastening methods used.

Another case history of production savings through careful analysis of fastening requirements is revealed by a special electronics terminal nut developed for use on an electronic calculator. This particular fastener, *Fig.* 5, is used for grounding electronic components, such as tube sockets, etc. The fastener attaches the socket to the panel in the usual manner but differs in that it incorporates a special soldering tab at one end which makes for phenomenal savings. Formerly, separate nuts, plain washers, lockwashers and soldering tabs were used.

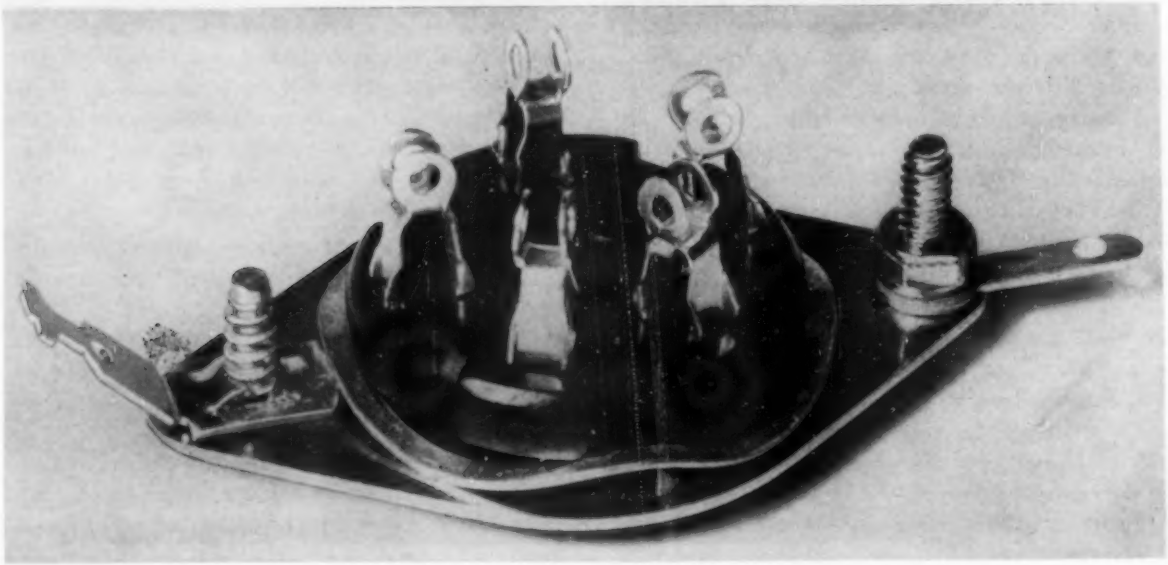
Now a single fastener provides self-locking, vibration-proof attachment, complete with a soldering tab. Savings reported for this project amounted to $11,000 per calculator.

Another manufacturer had a fastening problem on meteorological equipment. The fastener had to be lightweight, because the meteorological equipment was free-flying and air-borne and every ounce was at a premium. The precise nature of the unit made vibration resistance very important. Because the unit was expendable, every effort was made to minimize the cost. Standard fasteners of high-quality, heat-treated, spring steel were the answer. Applied by hand, they are self-retaining, provide vibration-proof retention of the coil form and prevailing torque adjustment of the tuning slug.

As industry prepares for more competitive markets, it becomes more and more necessary for the engineer to find a better, less expensive way of maintaining product quality. This is particularly true on the assembly line where fastening methods and procedures are brought into sharp focus.

As new products, new materials and manufacturing methods are introduced, the field for engineered fastenings will continue to widen. Reduced materials handling offers the best route to production-line savings, which will be reflected in lower cost to the manufacturer.

Fig. 5. The fastener shown at the left replaces the one at the right for fastening and grounding an electronic tube socket.



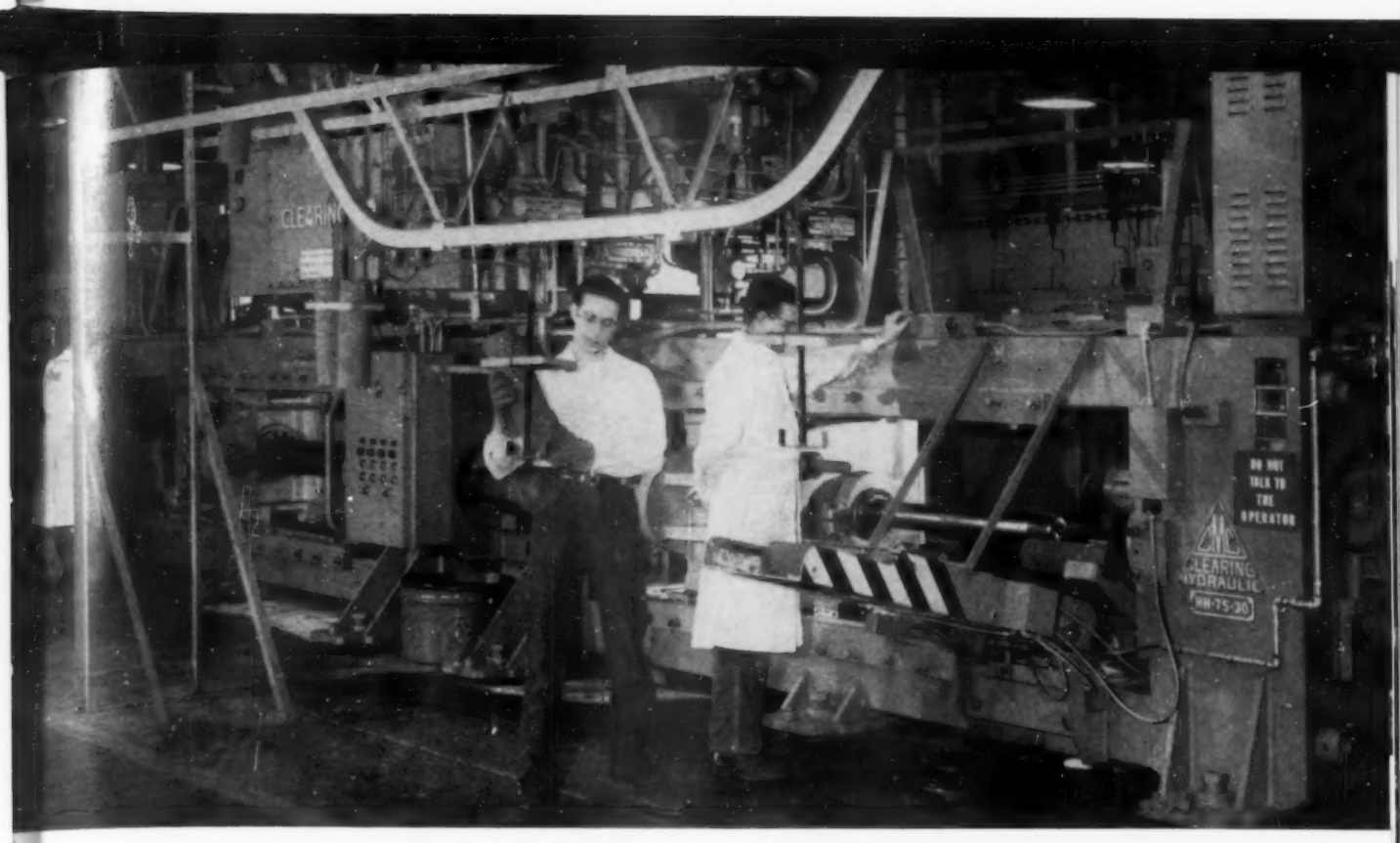


Fig. 1. Horizontal press performs drawing operations at both ends of its stroke, effecting the production of two presses.

Novel Press Increases Production and Facilitates Feeding

MANUFACTURING CARTRIDGE cases involves volume production to exacting standards of accuracy. To produce 90 mm cartridge cases faster and better the Rheem Manufacturing Co. mechanized their manufacturing setup and streamlined material flow.

For the cupping and drawing operations, a new type of hydraulic press was designed by the Clearing Machine Corp. This double-end horizontal press, *Fig.* 1, has certain advantages over equipment conventionally used for shell-case manufacture. A press drawing a shell to a final length of twenty-four inches requires an unusually long stroke. The long return stroke necessarily slows down the total stroke time. A way of reducing this lost time is to produce at each end of the stroke, eliminating lost motion from operating time. In addition to these features double-end press has a number of other advantages.

In terms of potential production, the press can be installed at a lower original investment than conventional equipment. Also, it requires no foundation pit and less manufacturing space than two conventional presses, especially where ceiling height is a factor. Conveyorized material handling arrangements are easily adapted to it. Maintenance problems are also simplified because its low silhouette makes the operating mechanism readily accessible. Power consumption, too, is reduced since it has only half the motor capacity of two separate presses.

Starting with a disk of 1030 steel 0.69 inch thick and 8⅞ inches in diameter, a series of press and auxiliary operations converts these heavy disks into a slender shell case, 24 inches long. The first operation performed on double-end presses is cupping. The part is forced through a carbide insert draw ring which reduces the wall thickness by approximately 44 percent, requiring approximately 265 tons for this operation. On the opposite end of the same press, parts go through the first draw operation, *Fig.* 2, reducing the wall thickness another 45 percent. Double-end presses perform

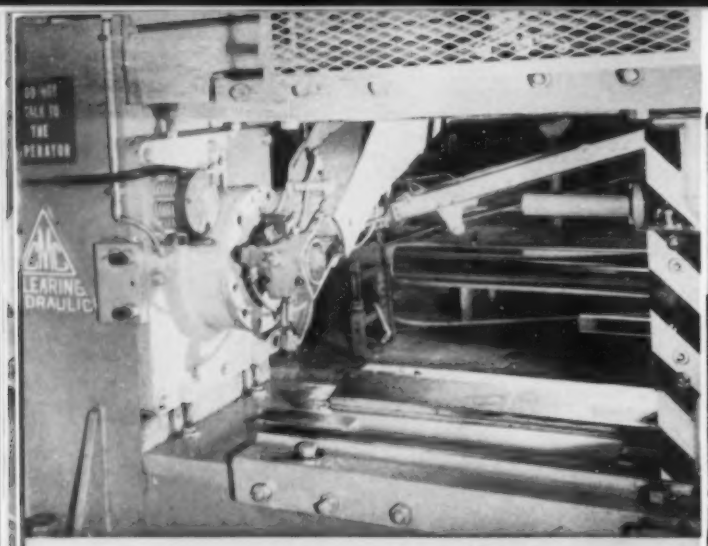


Fig. 2. Built-in mechanism feeds parts to the press and automatically controls press operation.

Fig. 3 To reduce the length of the punch stroke, a special feeding device lifts the work-piece into position.

three more drawing operations and a tapering operation to bring the case to its finished shape.

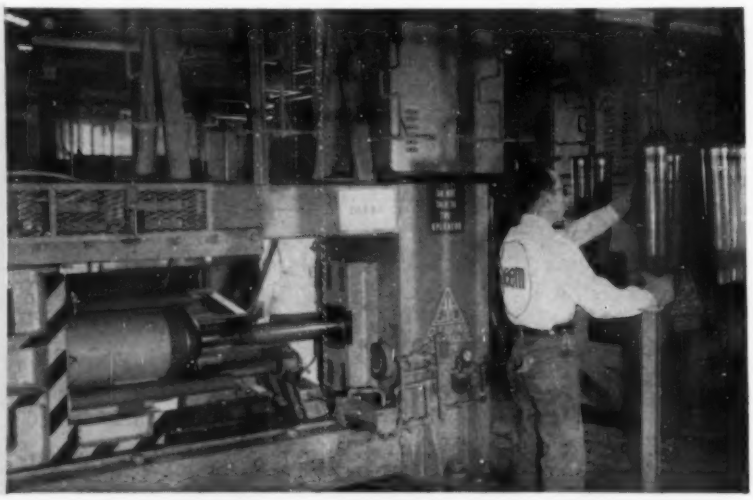
In *Fig.* 2 is shown a closeup of a feeding device for the first draw. Parts are fed through a chute which aligns the parts in position to receive the punch. Pneumatically operated paws hold the parts in the chute until the punch returns to its starting position. When the part is properly aligned, it engages a limit switch, controlling the punch operation.

On the third draw, *Fig.* 3, the feeding device is designed to hold down the length of the press. Parts are loaded into a chute but are lifted into position by pneumatic paws instead of sliding in front of the dies.

Fourth draw operations, *Fig.* 1, require approximately 45 tons of pressure, reducing the area by 2.4 percent and wall thickness by 37.5 percent. Before and after the fourth draw heading operations form the base of the cartridge case. Then tapering, *Fig.* 4, is performed. In this illustration, the unloading platform has been removed to show the tapering dies. For this operation 90 tons of pressure is required. The ejector is a 25-ton hydraulic unit built into the slide.

The base of the cartridge case is formed in two heading operations which are performed in 2,000-ton Clearing hydraulic presses. The presses are twins so that they may be interchanged should either one of them be out of service for die changes. The preheading and heading presses are each equipped with rotating dials on the bed. These dials swing 180 degrees allowing the operator to load the drawn part on the heading post at the front of the press. The post with its piece-part moves into position under the heading dies automatically in conjunction with the press stroke. Safety limit switches on these presses make certain that the case is properly positioned on the heading post before the press will operate.

Fig. 4. Tapering is the final forming operation. As the punch withdraws, an ejector is activated removing the piece from the post.



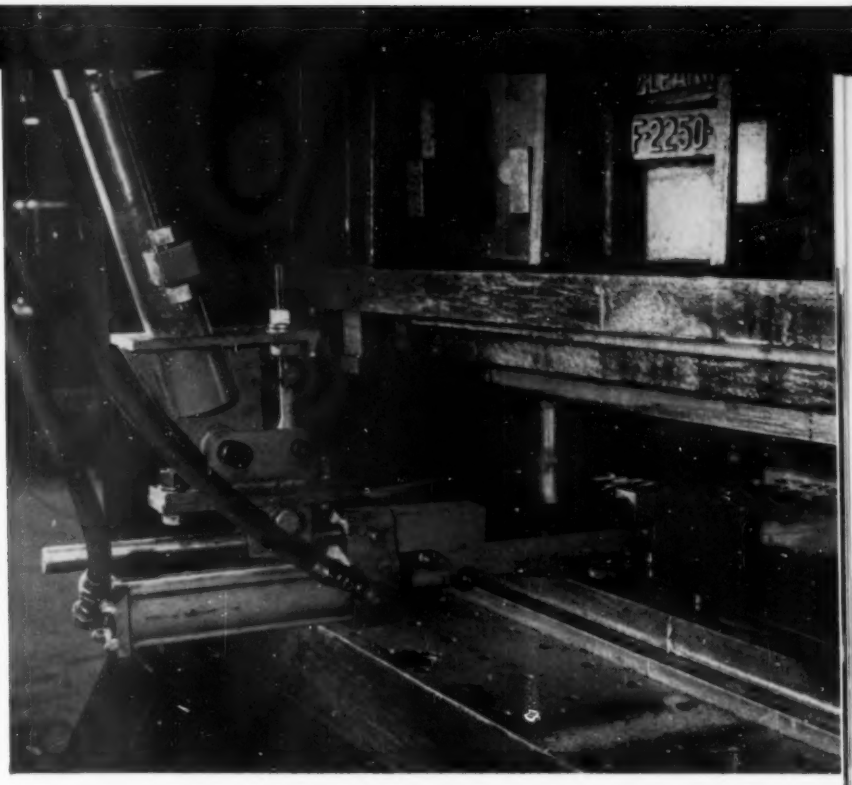


Fig. 1. Oven linings for electric ranges are removed from the press by means of a chisel type jaw.

PRESS UNLOADER Handles Diversified Stampings

By Henry Sahlin
President
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WITH LABOR COSTS still on the rise, more and more emphasis is being placed on automation as one of the major methods by which man-hour productivity can be substantially increased. The automotive and domestic appliance industries have been particularly active in utilizing this technique of moving parts to and from machines with a minimum of manual handling.

One area where automatic handling has brought immediate and sizeable increases in output, as well as important man-hour savings, is the press room. Although press-feeding devices and conveyors, cranes and other equipment for moving work from one press to another have been widely used for many years, there was no practical self-contained automatic press unloader for heavy and unwieldly parts available until the Iron Hand was introduced in 1947.

As many as three or four men were required to lift and transfer heavy, sharp-edged stampings out of a press. Besides being a constant safety hazard, manual unloading of presses prevented their operation at full-cycle capacity.

Industry is familiar with commercially available unloading devices for large and medium size presses, *Fig.* 1, which remove work pieces on the up-stroke. Perhaps, however, it is not so well acquainted with the developments in accessories that extend automatic unloading to entirely new applications. Important among these devices are a portable unloader for small presses and a special model for die-casting machines and similar equipment. Most of the efforts to widen the application of automatic unloading have been toward the development of various jaw types to meet different conditions, *Fig.* 2.

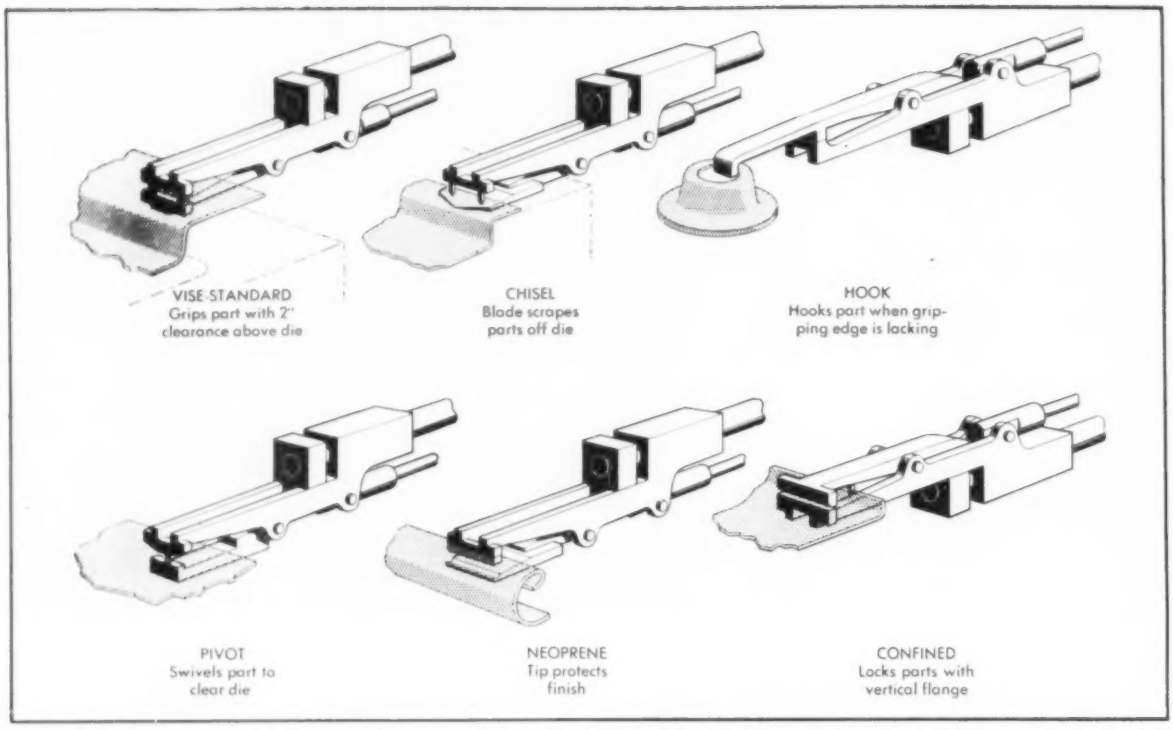

Fig 2. Various types of jaw assemblies can be used with press unloaders to adapt them for removing diversified workpieces from presses.

Standard Vise Type: The vise type was the original jaw design and is still applicable to a majority of stampings, regardless of shape, size or weight. It grips panels having a minimum of two-inches' clearance from the lower die, that is in the case of drawn stampings, those that are lifted two inches or more above the draw ring. It has four vise grippers, two each on the upper and lower jaw sections.

Many leading automobile manufacturers use these vise-type jaws to unload large body stampings. *Fig.* 3 shows a vise jaw gripping a door panel in an installation at the Milwaukee body plant of Nash Motors.

Chisel Type: The chisel jaw, together with the vise type, is applicable to 75 percent of press unloading jobs. It is recommended for stampings that are not lifted off the lower die. The lower-jaw member is a chisel blade which scrapes the panel from the die surface. The upper jaw has two cone-point grippers. It can also be used to unload stampings which are lifted off the die.

Hotpoint, Inc, Chicago, is among the firms making use of chisel jaws in their press unloading installation, *Fig.* 1, where oven linings for electric ranges are being unloaded.

Hook Type: The hook jaw was developed for stampings that lack a gripping surface but have a hole or pierced section that can be utilized for lifting the stamping out of the die. Barrel heads and channel-shaped panels fit into this category. The lower-jaw assembly of the hook-type jaw is especially designed to suit the panel to be removed.

Pivot Type: Pivot jaws are used to unload stampings where die clearance is facilitated by pivoting the panel free. Certain automotive front

Fig. 3. A Vise-type jaw is used to grip door panels at the Milwaukee body plant of Nash Motors.

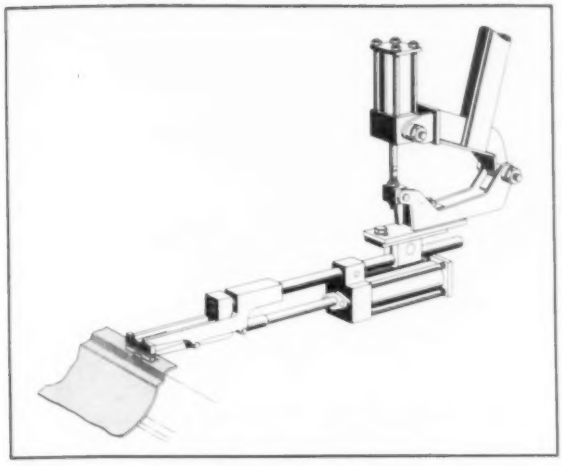

Fig. 4. When this floating mechanism is incorporated in the unloader, large parts can be lifted as much as 20 inches vertically to clear the die before the outward swing.

fender press and die setups call for this jaw type. Pivoting is also desirable where there are succeeding operations. The jaw has a single cone-point gripper on each of the upper and lower jaws.

Confined Type: The confined type removes stampings with a vertical flange. Designed to the dimensions of the flange, it confines, rather than grips, the stamping, thus preventing the flange from being crushed and the stamping from being marked. It is applicable only where the stamping is lifted at least two inches off the lower die surface.

Neoprene Type: The neoprene-tipped jaw is designed to unload finished stampings that must be free of abrasion and indentation such as windows or garnish molding. The upper jaw is neoprene tipped and keeps parts unmarred; the lower jaw confines the stamping rather than gripping it.

With the recent introduction of a floating mechanism, *Fig.* 4, automatic unloading by the Iron Hand can be applied to still further conditions. This mechanism facilitates the unloading of large panels that have to be lifted out of the die more than eight inches.

A normal four to eight inches vertical travel is supplied by the standard device. The floating mechanism provides as much as 12 inches additional vertical lift to the jaw, enabling it to raise the panel clear of the die before beginning the outward swing. This is accomplished by pivoting the jaw assembly at the back, as shown in *Fig.* 4, and raising it by means of an air cylinder mounted above the jaw assembly. As soon as the panel is gripped, it is raised by means of the air cylinder a predetermined distance, up to 20 inches, before it is pulled out of the press by the mechanical unloader.

Simplify Contour Machining

MACHINING OF DIFFICULT contours for guided missile parts at Rheem Mfg. Co., Downey, Calif., is simplified by equipping standard lathes with Turchan Followers. As a coincidental advantage the method proved to require only 68 minutes to complete the part, as compared to 3 hours by the conventional method.

In turning the inside and outside diameters of these air tank heads, 23 lb. of stock of 12-inch diameter must be removed from rough forgings of 4130 aircraft steel. This is accomplished with + 0.005/—0.000 tolerances.

A full spherical radius has to be cut inside. The contour starts straight, blends into a 2¾-inch radius and blends again into an 8-inch spherical radius. By ordinary methods this seemed almost impossible, but the problem was solved with installation of Turchan Follower Machine Company's hydraulic duplicators which would meet any combination of the lathe's feeds, speeds and tooling.

A stylus point follows the template to guide the tool by power cross feed, reproducing the exact contour on the part. The ease of setup and simplicity of tooling with this attachment provides several advantages, including use of conventional tools which produces a better, smoother surface finish than can be obtained with costly form tools. The finish tool for making the final cut requires no adjustment for size from rough to finish since tools are set in proper relation. Facing to length, inside bore and radius to centerline are all controlled by the template and first size setting when setup is made. Calipering is confined to first diameter only, with subsequent diameters obtained automatically.

Taking Square Root by Sweeps

By Edward C. Varnum*

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IN THESE DAYS of high-speed automatic calculators there is a trend towards doing old tasks in new ways. One of the most common tasks is the extraction of square root, a tedious procedure by conventional methods. The method discussed in this article for determining a square root involves only simple division and addition. For most practical purposes one set of operations, called a *sweep*, is sufficient. An automatic calculator performs several sweeps until successive answers agree to many digits.

To take the square root of a given number the following steps are performed:

1. Guess a number which is close to the square root of the given number
2. Divide the given number by the guessed number
3. Average the results of steps 1 and 2.

These three steps comprise one sweep. To obtain a better approximation, the three steps are repeated, using the answer of the first sweep as the guess for the next sweep. The successive guesses will be closer and closer together as they become smaller and smaller. The true square root will be smaller than any of the guesses after the first. The success of a single sweep depends, of course, on the wisdom of the first guess which should be as close to the true answer as is easily possible.

A few examples show how effective the method is:

EXAMPLE 1: Take the square root of 151.

1. Guess 12, because 12 squared is 144
2. 151 divided by 12 is 12.583
3. The average of 12 and 12.583 is 12.292.

The true square root of 151 to three decimals is 12.288, which indicates an error of 0.004. For a closer approximation, the process may be continued by performing another sweep:

4. Guess 12.292 from the previous sweep
5. 151 divided by 12.292 is 12.284
6. The average of 12.292 and 12.284 is 12.288.

This agrees with the true square root to five significant digits.

EXAMPLE 2: Take the square root of 99.78.

1. Guess 10
2. 99.78 divided by 10 is 9.978
3. The average of 10 and 9.978 is 9.989

The true square root of 99.78 is 9.98899 which indicates that the result of the first sweep is correct to the nearest 0.001. This good result is, of course, due to the fact that 99.78 is close to a well-known perfect square.

EXAMPLE 3: Take the square root of 7.634.

1. Guess 3
2. 7.634 divided by 3 is 2.545 to the nearest 0.001
3. The average of 3 and 2.545 is 2.772 to the nearest 0.001.

The true square root of 7.634 is 2.763. Continuing the process through the second sweep:

4. Guess 2.772 from the previous sweep
5. 7.634 divided by 2.772 is 2.754
6. The average of 2.772 and 2.754 is 2.763. This agrees with the true root to four significant digits.

From these examples, it may be seen that two sweeps or six simple steps give results to the nearest 0.001. In some cases a single sweep will give this accuracy. For many applications to industrial statistics an accuracy of one in the third decimal place of a square root is not required so that only a single sweep (3 steps) will be sufficient.

*Senior Member of ASTE Rockford Chapter No. 12

Tool Engineering Report No. 13

Handling Materials in Process

By Robert T. Kimmel

MATERIALS HANDLING in the metalworking industries must include all phases of the subject from the time the raw material is delivered until the finished product is shipped. Materials handling is a term that is sometimes used to define what is done with the raw material upon arrival and with the finished product when it is ready for shipment. That leaves a large void. Materials handling is of vital concern in the plant during process and production. Every manufacturer can buy the raw materials at approximately the same market price. It is how he plans the process within his plant that determines the cost of the finished article. One phase of this problem is materials handling.

When planning a new plant for a specific product, it is easy, by following established procedures, to come up with an efficient and economic plant layout which will serve the purpose for which it is intended. That is, starting from scratch and utilizing all the tools, aids and information which is available, the plant layout engineer can design and have built factories which serve their purpose admirably. One method of doing this is the three-dimensional miniature of the plant, *Fig.* 1. Here the designer,

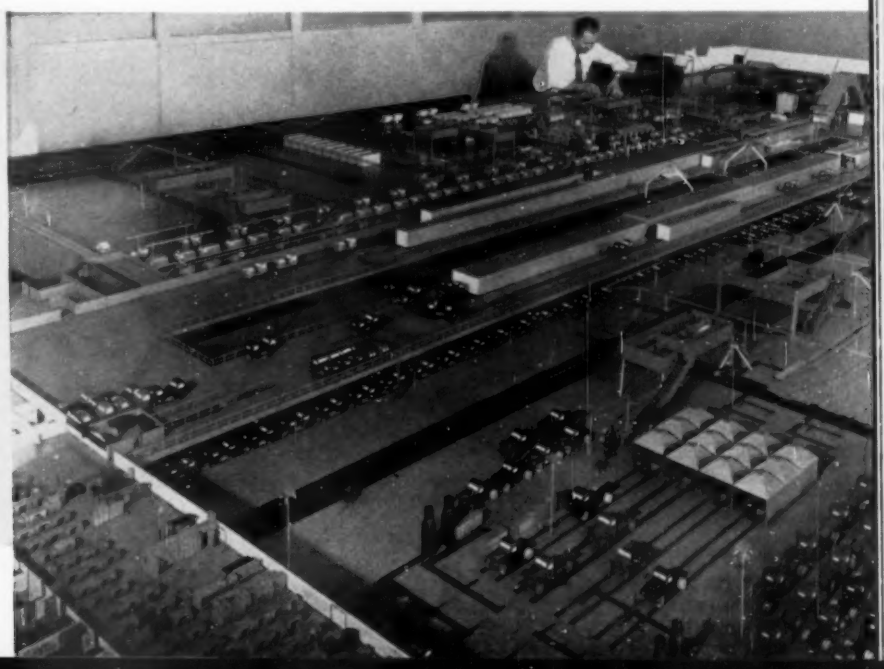


Fig. 1. Materials handling facilities are easily incorporated in a plant layout when a three-dimensional model is available for study.

manufacturing engineer, production men and management can see in concrete form how any proposed plan will work, or how it will fit in with existing facilities. At each stage, provisions can be made for handling the material. But instances of this kind are the exception rather than the rule.

For plants already in existence, the need is for standard units which can be adapted for handling a variety of workpieces economically. There are not too many plants which produce the same thing year after year. Design changes and variations demand a system which will be able to cope with numerous kinds of materials in many different shapes.

Available at the present time are different kinds of standard materials handling devices such as industrial trucks, *Fig.* 2, cranes, conveyors, *Fig.* 3, hoists, *Fig.* 4, lifts, and many others. These units have been designed to fit a wide range of applications and can be fitted into existing facilities with a minimum of rearrangement. In each case, they are used to move the workpieces from one operation to the next, and choice of the equipment is largely determined by the characteristics of the pieces to be moved, *Fig.* 5.

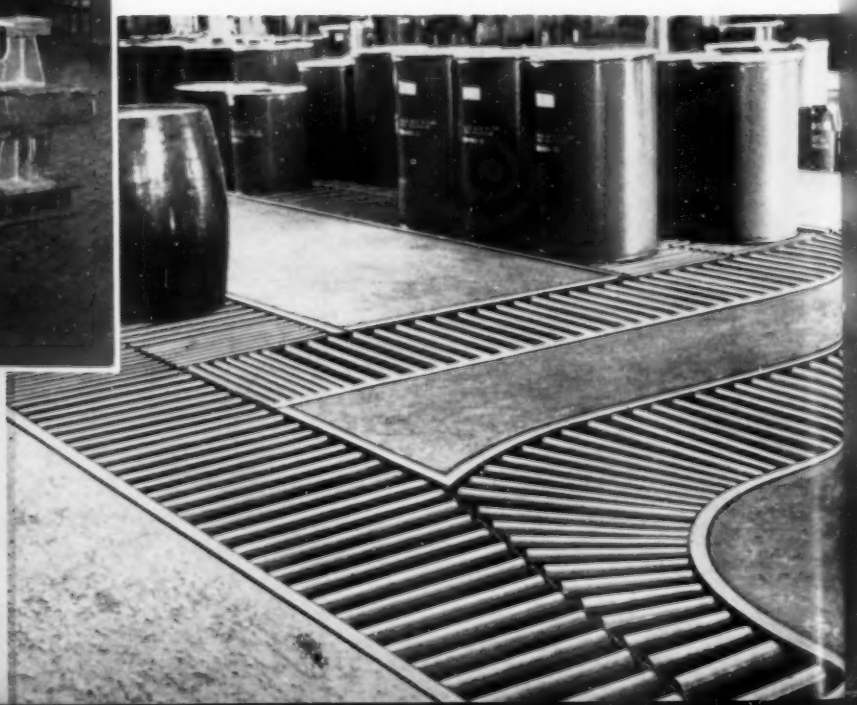
Before setting up a materials handling system for a plant, it is necessary to make a survey of the plant's overall traffic and materials handling problems. Such surveys are best conducted by people experienced in materials handling methods. This part of the industrial enterprise is becoming more and more a very specialized business. A survey of this kind must cover a number of conditions in the plant: the distances and routes over which materials must move, the condition and number of floor levels, the steepness of ramps, size of door openings, height and strength of ceilings, walls and columns, and headroom clearances. Attention must also be paid to the size, weight, physical nature and rate of flow of the products to be handled, as well as to packaging and storage facilities, *Figs.* 6, 7, 8 and 9.

When these and other important factors, including costs, are known, the methods and equipment best suited to the plant's materials handling problem can be determined. By taking into account the fundamental advantages and limitations of the principal materials handling systems and equipment, it is possible to select either a single system or a combination of systems. This first decision is tentative. It is then necessary to consider whether the volume of work warrants investing in the theoretically best system. Comparative costs for each system should be carefully studied.

Specialized types of conveyors are available for handling all sizes, weights, and kinds of materials

Fig. 2. (above) Industrial trucks of different types handle a variety of material.

Fig. 3. (below) Conveyors are a versatile type of materials handling device for moving almost any kind of workpiece.



at various speeds and over various distances. Stationary and mobile cranes and hoists of all sizes can be equipped with hooks, buckets, magnets and a variety of other mechanisms capable of doing a wide assortment of jobs. Industrial trucks are designed for lifting skid or palletized loads.

Each of the various materials handling systems has its own definite advantages. However, the various systems supplement rather than compete with each other. There are many materials handling installations where all the systems are used, each doing the work for which it is best suited under specific conditions.

For maximum economy and efficiency, an integrated combination of systems should be used wherever practical. The low-lift truck-skid system can be combined with the fork truck-pallet system. If there are long hauls, the tractor-trailer systems can be added. Conveyors are used for steady, continuous movement over a fixed route. Cranes, hoists, monorails and other handling equipment offer additional advantages, and can be combined with the other systems.

Industrial Trucks

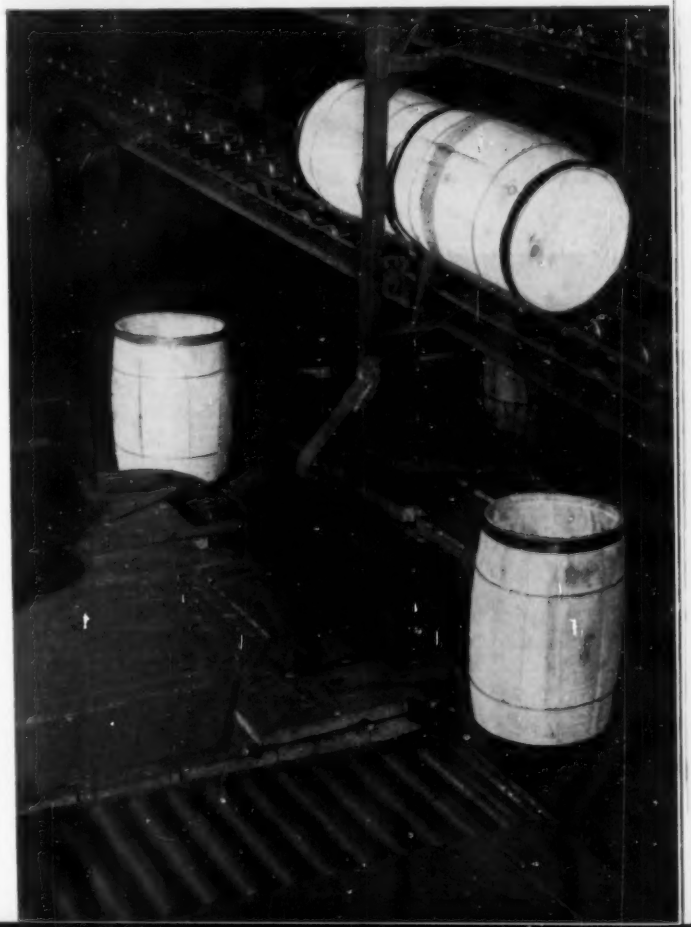
For general use there are numbers of standard model industrial trucks available. These are of the type that push, pull or carry loads from one section of a plant to another, *Fig* 10. They are suited for a wide range of applications and the choice of a particular model is largely governed by the type of materials to be transported. Another important consideration is conditions under which these trucks will operate. Attention must be given to aisle space and maneuvering room. Here again, it is easy when planning new facilities to make provisions for truck operation. In other cases where trucks may seem to be the logical answer to a problem, they are impractical because of existing facilities which prevent their use.

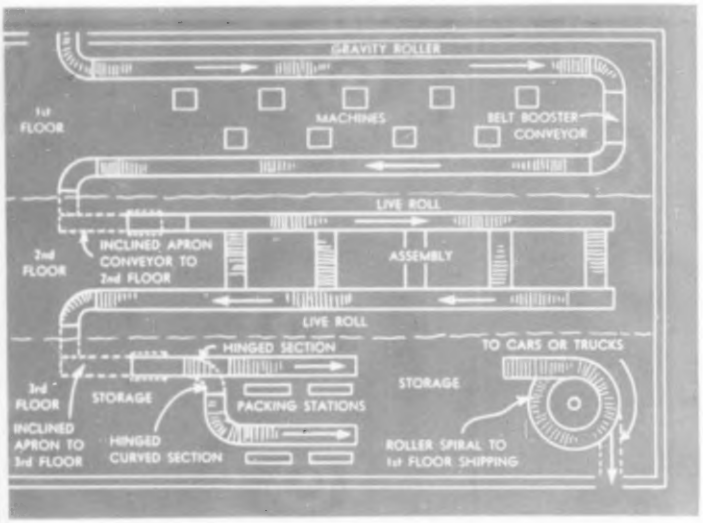
In addition to the standard models, trucks are built for many special purposes. There are any number of attachments which can be ordered for fork trucks so that they can perform certain special duties. For instance, in handling coiled sheet stock, trucks are now available with an attachment which will permit picking up and carrying any kind of coil from the smallest to huge loads which ordinarily would require heavy-duty overhead equipment, *Fig.* 11. In other instances, these attachments have been designed to handle pieces by means of clamping devices.

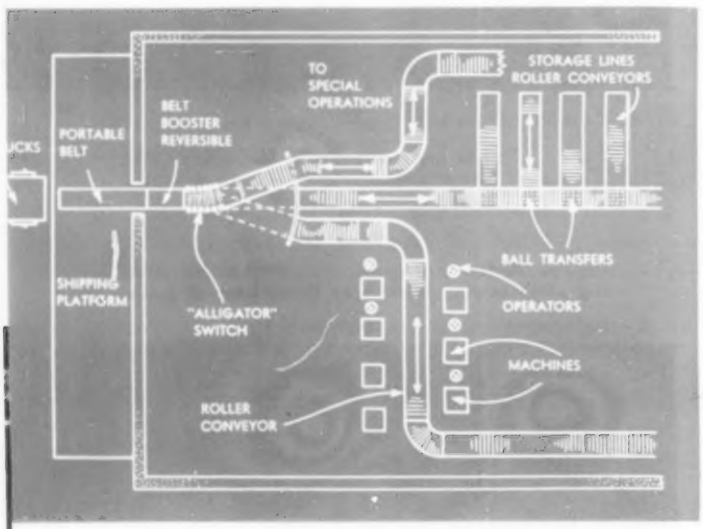
A tractor trailer system, *Fig.* 12, employing industrial trucks is a pure haulage system. The tractor supplies motive power; the trailers carry material.

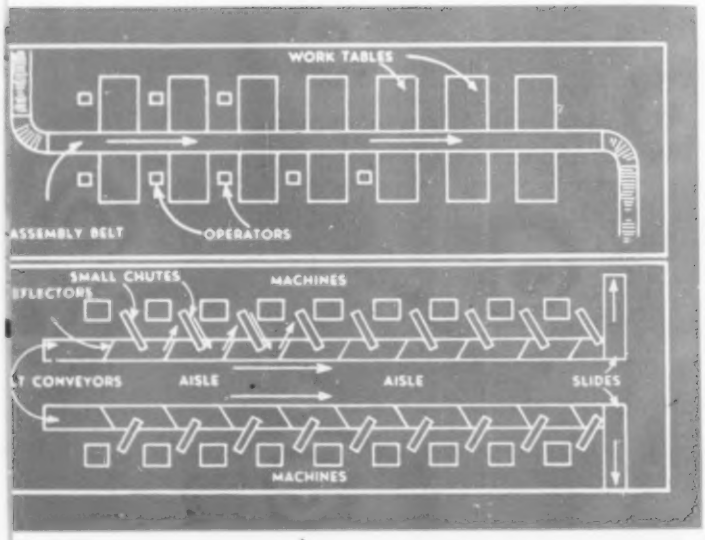
Fig. 4. Hoists can be utilized for many jobs. The chief disadvantage is the lack of mobility.

Fig. 5. Roller conveyors are suitable for moving most materials such as these kegs of nails.









Loading and unloading are done by cranes, hoists, platform lift or fork trucks. The system is an economical method of hauling large quantities of material for distances over 300 feet. The per-ton cost for handling material in this way is very low, because one tractor can move many loaded trailers in one haul.

The platform truck and skid system is another method which incorporates industrial trucks. The high-lift platform truck can tier loads, whereas the low-lift truck only lifts the load a few inches, high enough to move it from one place to another. Both trucks pick up, transport, and set down skid-loaded materials without manual rehandling. The fact that the fulcrum of the platform is up forward enables

Fig. 6. (top) In this layout, tote boxes pass through machining via roller gravity and belt booster and are then raised by an inclined apron conveyor to assembly lines on the second floor. A second inclined apron lifts the finished products to the third floor packing and storage area.

Fig. 7. (center) This entire system is reversible, with materials moving in and out over the same equipment. Materials are received on a portable belt at the shipping platform, move onto a belt booster delivering to a three-way alligator switch. Ball transfers are used in the roller conveyor line to facilitate transfer to and from storage lines.

Fig. 8. (below, left) A four-story "gate-bed" lift raises incoming material from the first to the fourth floor, with gates for discharge at intermediate floors. A spiral chute lowers materials from operations on fourth and third floors for packing on the second floor.

Fig. 9. (below) Heavy units coming from the shop are sorted over this system of alligator switches. Curved sections and curved hinged sections permit the units to move by way of roller conveyors to storage lines and shipping.

(Layouts courtesy of Logan Co.)

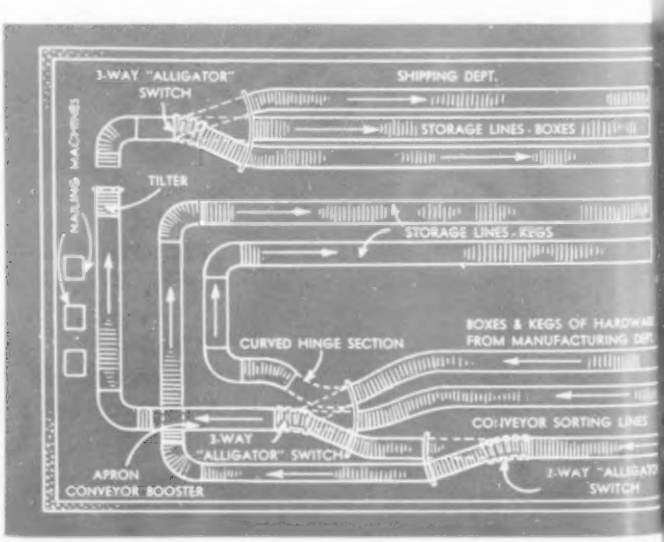


Fig. 10. This industrial truck is picking up a loaded skid from a storage area.

this truck to carry very heavy loads.

The principle of the fork truck and pallet system is the same as that of the lift truck and skid system. The forks require less clearance than the elevating platform of the lift truck, making it possible to have pallets, shallower than skids. This saves space in storage. Double-faced pallets make possible wider load distribution, another space-saving feature.

The powered hand truck is designed to move either a pallet load or a skid load from one place to another. Recent models can also stack. Like the other types of equipment, there are many variations. The powered hand truck is ideally used in moving material when the weight or total volume of the material is too small to justify larger equipment. Its light weight and small size are of advantage when floor load capacity is small and space is confined.

Cranes and Hoists

Materials handling devices of this type are more or less fixed in position and are utilized for a particular application. Most of the larger machine tools handle workpieces which are of a nature which require lifting devices to position them in the machines. They are adaptable for handling any size or shape of unit; the chief limitation is the fixed working area. Cranes and hoists range in size from the smaller ones used in a fixed position to the huge bridge cranes which can carry tremendous loads the length of an aisle.

In *Fig.* 14 the operator is using an electric hoist to place a crankshaft in position on his lathe. The bridge crane can be used to lift such items as steel strip stock in a warehouse. In this instance, the controls are located so that the operator on the floor maneuvers the crane. In larger models, such as in *Fig.* 15 the operator rides in a cab which is an integral part of the crane itself.

The gantry crane is an adaptation of the overhead travelling bridge crane. It is used for outdoor applications where an overhead structure is undesirable. The crane bridge is mounted on movable trestles. The trestles have trucks, similar to those on an overhead crane, which travel on rails. This type of crane is used most often for receiving raw materials.

Another type is the truck crane, *Fig.* 16, which has capacities ranging up to 20 tons. The lifting capacity is about 85 percent of the tipping load. With some models the truck can be moved, the load hoisted, and the boom swung simultaneously.

Hoists are often used in restricted areas for lifting loads from 250 pounds to three tons, *Fig.* 17. For light loads, a hand-pulled chain hoist is sufficient for hoisting and lowering. Heavier loads can be hoisted electrically and controlled by a push-button pendant station.

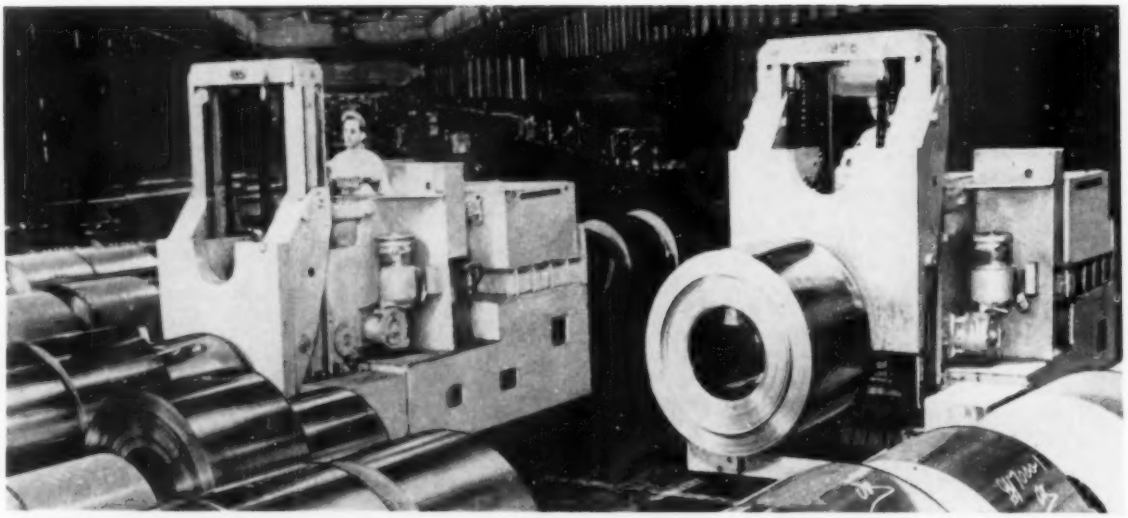


Fig. 11. Special attachments for fork trucks permit their adaptation for hauling most any kind of load.

The push-type trolley can be moved, with its load, as fast as a man can walk. Considerable effort is required to start a heavy load moving, but very little effort keeps it moving.

The hand-geared trolley is moved along the track by pulling on an endless chain. It is used when loads must be spotted accurately regardless of their weight, when ease of movement is paramount, or when the loads weigh more than three tons.

Fig. 12. Tractor-trailer systems of materials handling are useful where quantities of materials must be moved some distance.

Conveyors

Conveyors can handle almost any kind of material. The choice of any particular conveyor for an installation must depend on the circumstances involved. It is here that the experienced conveyor engineer can contribute to the success of the overall project. The selection depends upon many factors which are variable even in plants of the same industry. In these examples, the articles are typical.

Roller conveyors, *Fig.* 18, will handle virtually any type of package, container or article which has a reasonably firm and straight surface to contact the rolls. Irregular articles and flexible items such as sacks are not practical unless placed on pallets or in containers. Sacks are sometimes handled with steep pitch and close spacing. Roller conveyors are the basis of most installations because of simplicity, economy and negligible maintenance.

Spiral chutes will handle many articles listed for the roller conveyor, but cannot handle at all such materials as barrels on end, items on pallets, and certain fragile articles. Because of pitch required, there is more chance of breakage and spoilage from open top containers and they cannot be used for storage. However, spiral chutes are adaptable for use in a wide range of industries. There is practically no maintenance cost involved.

Roller spiral conveyors, *Fig.* 19, handle virtually all items that are handled on roller conveyors with the exception of certain items on flat pallets. They are normally the best means of lowering by gravity. They give smooth operation at small pitch. Con-

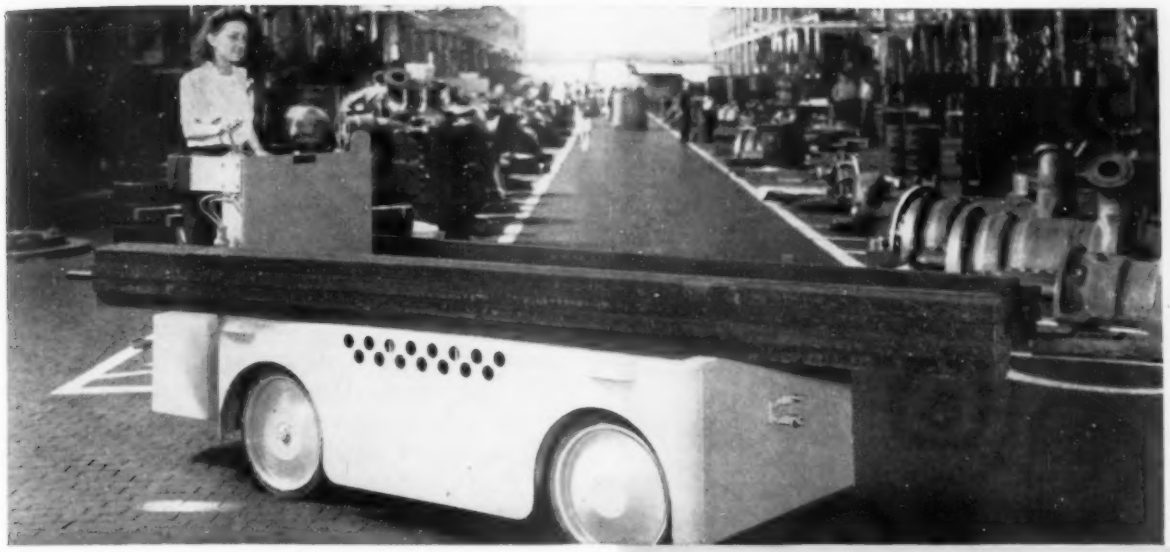


Fig. 13. Material such as steel bars are easily handled by industrial trucks.

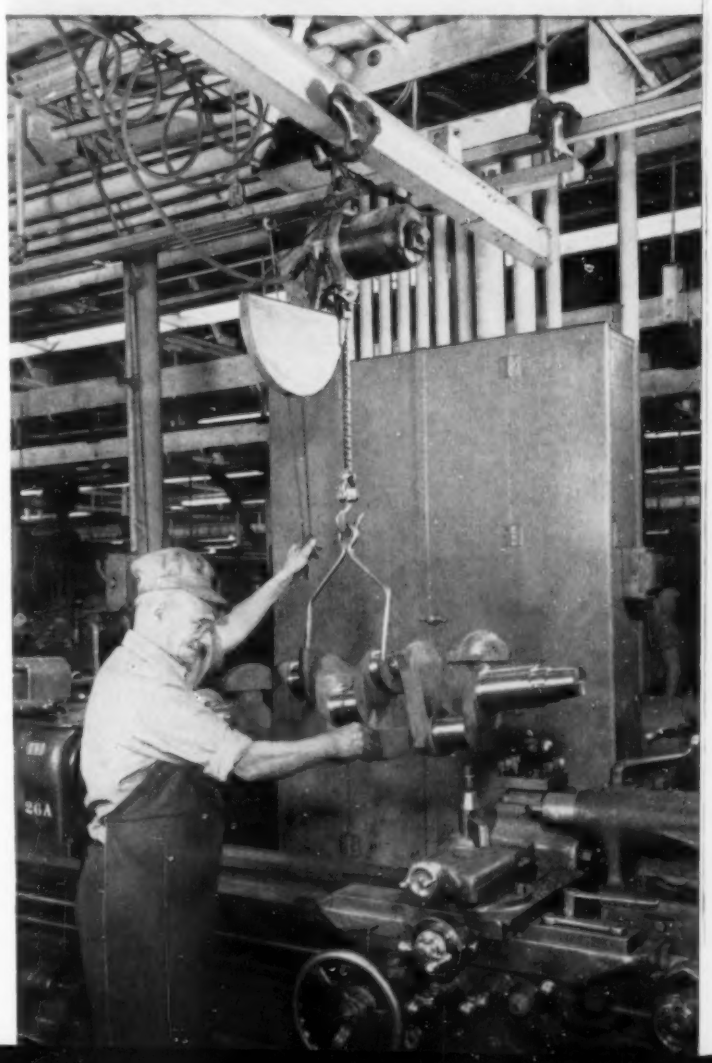
trolled speed of travel permits handling open top containers without spillage and handling on end of tall packages, barrels, etc. This type of conveyor virtually eliminates breakage and is frequently used for live storage.

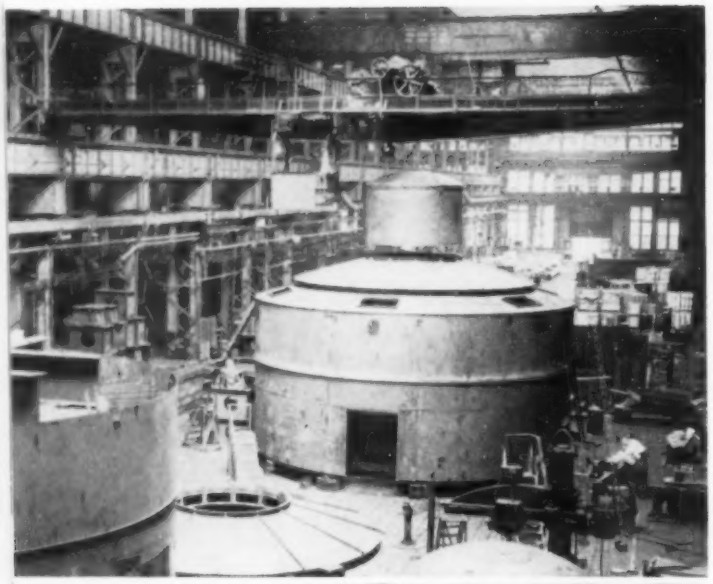
Slides can handle most articles listed for roller conveyors with the exception of items on pallets, top-heavy items, or such fragile items as molds, etc., which are sensitive even to light jars and shock. Slides are limited in application due to steep pitch required. They meet certain conditions economically. Most common application of slides is in gravity lines to pass workpieces through a floor, thus decreasing the size of the floor opening.

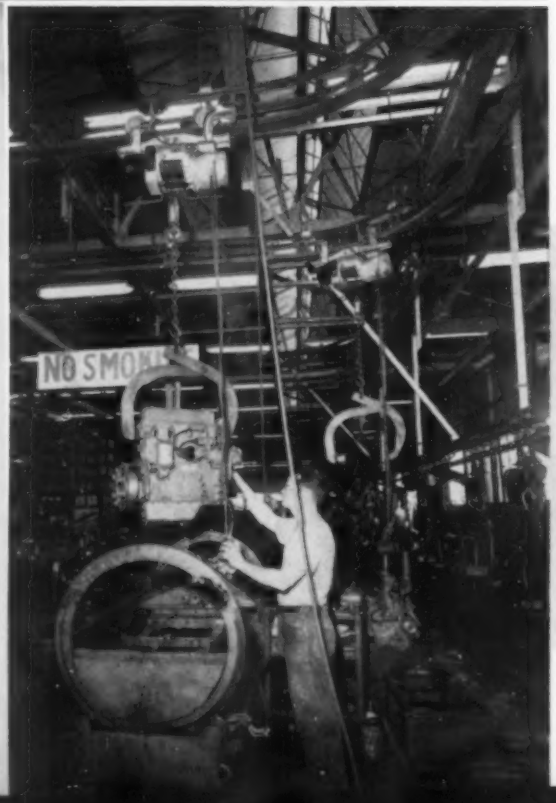
Live roller conveyors handle the same items as the roller conveyor. Live rolls, *Fig.* 20, consist of a roller conveyor on which rolls are actuated from beneath by a continuous belt. This provides a power conveyor, requiring no grade, which operates at constant convenient working height. Workpieces can be stopped while the conveyor continues to run, without excess wear. It can be double-decked to utilize both belt runs. It is ideally suited for such automatic features as stops and deflecting arms, and can operate at slopes to about 12 degrees.

Belt conveyors, *Fig.* 21, handle most items that will travel on a roller conveyor. They are effective for many kinds of units not suited to direct contact with conveyor rolls, such as sacks, flexible or uneven bottom items, or small parts. They are not adaptable to certain kinds of extra heavy handling or where there is appreciable loading shock. Belt conveyors will handle a great variety of items and have a broader field of usefulness than any other type of power conveyor. They operate satisfactorily at moderate inclines.

Fig. 14. An electric hoist is one of the best means for lifting and positioning a heavy workpiece.







Apron conveyors, *Fig.* 22, will handle virtually anything but their use is indicated where there is definite loading shock or where weight is too great for efficient handling by belt conveyor. It is advantageous for operating on inclines and is frequently used to lift or lower between floors. Apron conveyors provide a strong rigid carrying surface. They consist primarily of two endless strands of roller chain connected by slats of steel or wood.

The wheel conveyor has a limited use for certain light and medium duty handling jobs. Wheel conveyors will handle items having a solid and reasonably firm bottom. They are used to handle bundles of material and items with an irregular shape. They will operate on slightly less grade than the roller conveyor.

The pusher bar lift will handle virtually any article which can be pushed with a bar over a smooth surface. For lifting at angles between 30 and 60 degrees, this pusher bar type of conveyor is normally used. Workpieces slide on a stationary bed and are moved by pushers mounted at intervals between two endless strands of roller chain. The bed is usually of sheet steel and the pushers are ball-bearing rollers as a rule.

Ball or wheel transfers, *Fig.* 23, will handle practically any article which has a smooth firm bottom. They are used to transfer pieces at right angles without turning them, and also to turn pieces around without lifting. Ball units should be spaced to allow at least nine units under each piece to be handled.

Vertical Lifts

The vertical lift, *Fig.* 24, handles a variety of pieces. While inclined lifts such as belts, pusher-bars, apron conveyors and others are recommended, wherever possible, for reasons of economy and simplicity, it is sometimes necessary due to

Fig. 15. (top) Bridge cranes in larger shops are used to move pieces of equipment ranging in size from the smaller tools to these huge hydro generators.

Fig. 16. (center) Cranes mounted on trucks are suitable for handling materials in locations where there are no fixed facilities.

Fig. 17. (bottom) Overhead hoist facilities cut costs. This hoist has a motor-driven trolley.

lack of floor space or other conditions to install a vertical lift. It operates in two directions. Carriers on the lift are suspended from two endless chains running in channel guides.

Special Devices

Each materials handling problem is unique in that so many factors must be considered. Where a standard unit will not fit into the existing situation, often some method can be worked out so that materials handling is incorporated into a production machine. One instance of this is the Rockford Ordnance Plant. Following is a description as given by John Diebold in his book, *Automation*.

"Steel is received in six-inch square bars about 24 feet long. These bars are positioned at a series of metal-cutting saws by a manually operated overhead crane to be cut into pieces about a foot long and weighing approximately 120 lb. Thereafter, until the finished shell case is packaged, it is not again touched by human hand. Except for shells removed from the line for inspection, all operations are entirely automatic.

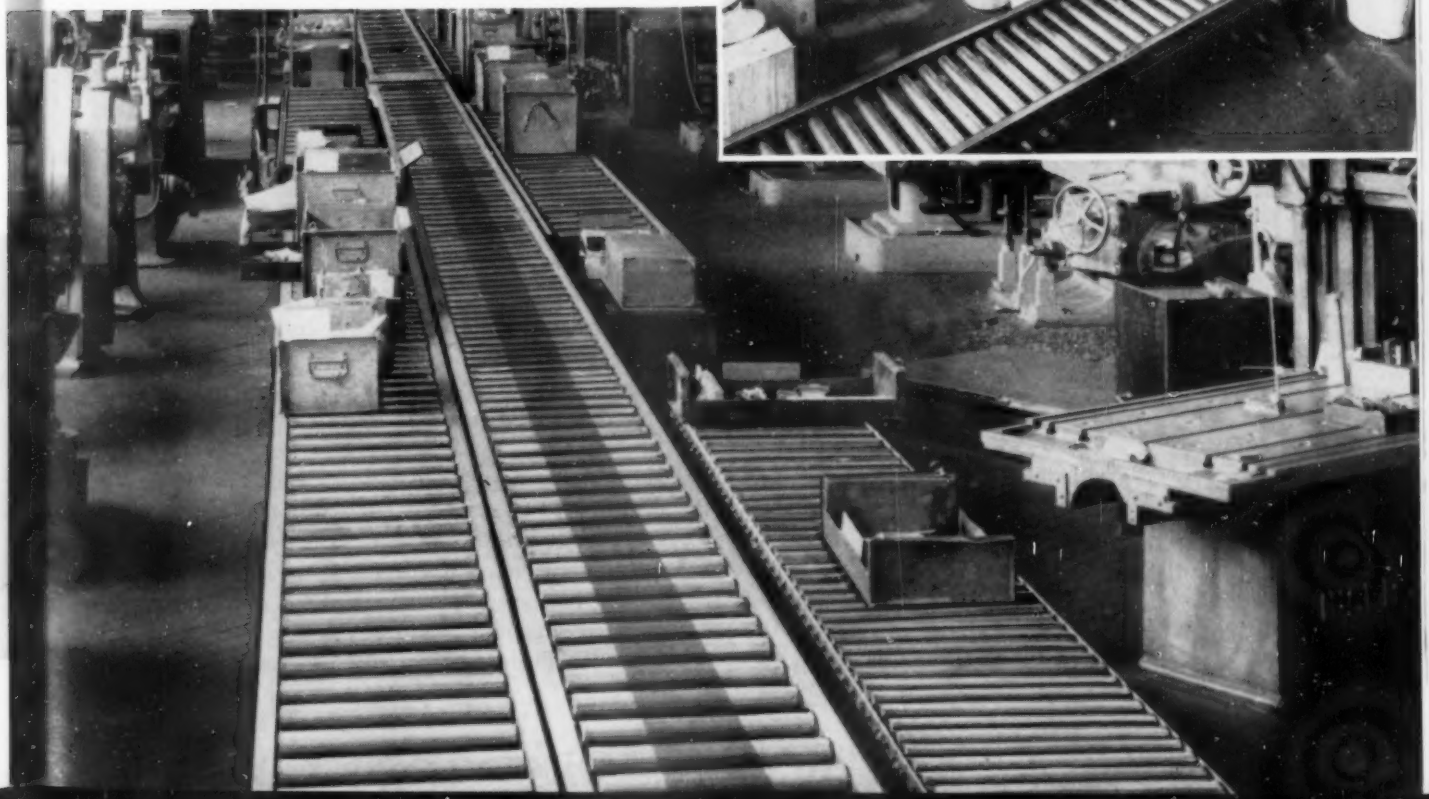
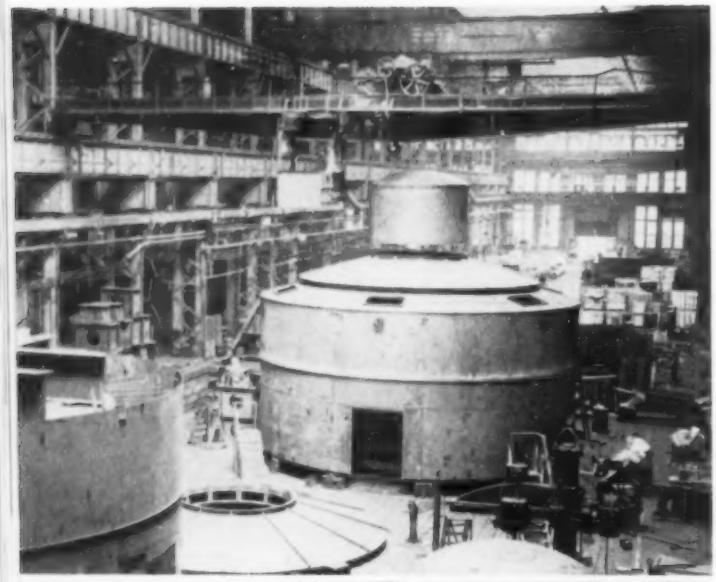
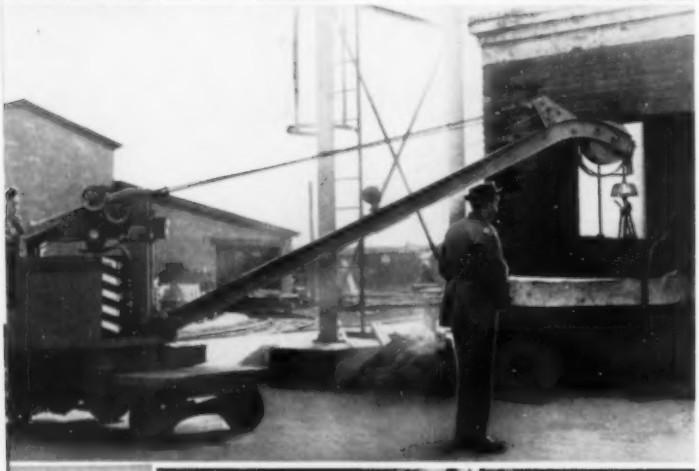


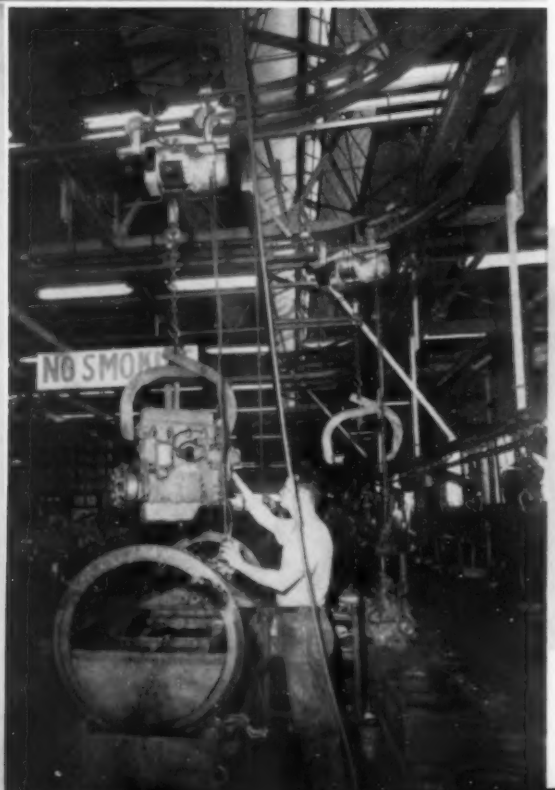
Fig. 18. (top) Roller conveyors handle virtually any kind of workpiece and in any quantity.

Fig. 19. (center) Roller spiral conveyors are used to transport material from one floor to another.

Fig. 20. (bottom) Live roller conveyors such as this are activated from beneath by a continuous belt, and require no grade.







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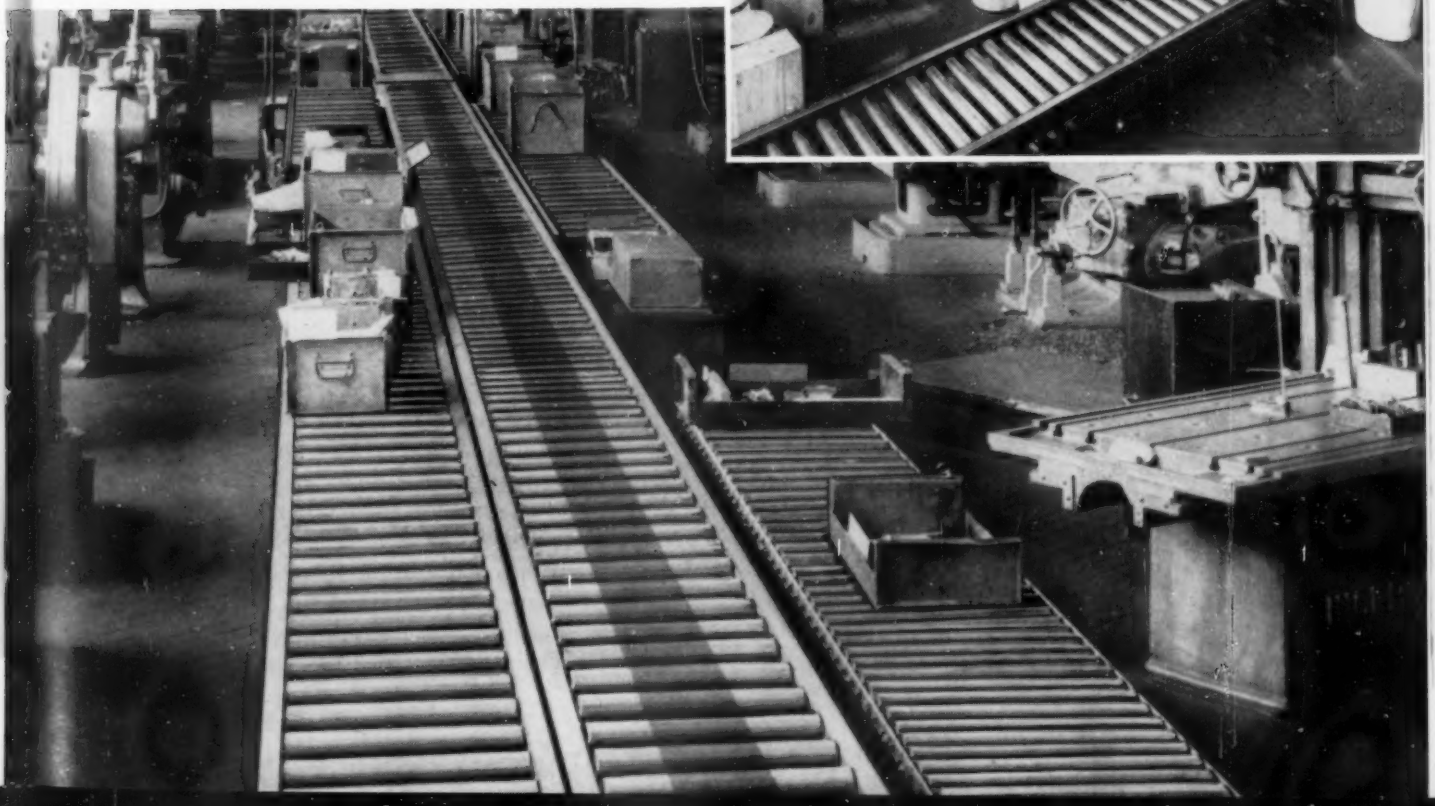


Fig. 18. (top) Roller conveyors handle virtually any kind of workpiece and in any quantity.

Fig. 19. (center) Roller spiral conveyors are used to transport material from one floor to another.

Fig. 20. (bottom) Live roller conveyors such as this are activated from beneath by a continuous belt, and require no grade.

"As the steel blocks are sawed off, they roll onto an inclined ramp made of a series of rollers. At the end of the ramp, they fall into stirrup-shaped racks. These racks, or conveyors, are the basic materials-handling units used throughout the operation. The racks are made of light pieces of formed steel and hang from an overhead conveyor. They are uniform throughout the plant and carry both the raw steel billet and the finished shell casing. This materials handling equipment is an example of what is possible in the way of flexibility for a range of different products; the same device can be used for handling other products.

"The overhead conveyors carry the billets to the two huge circular ovens that heat the stock prior to forming. The billet is knocked from the conveyor by a simple rocker arm arrangement that is activated when the conveyor comes in contact with a trip switch. The billet slides down another series of inclined rollers and is stopped by the inventory of billets which has collected in front of the oven door. The loading device, which is a pivoted mechanical jaw type, moves downward, the jaws fasten on a billet; the device then moves up and the whole mechanism is moved toward the door of the oven. The oven door is opened mechanically, the action being started and stopped by an operator at a console. The duck puts its head into the oven, places the billet on the slowly revolving floor of the oven, moves back, and the oven door closes.

"After heating, the billets are automatically put onto a conveyor that carries them to a machine for removing scale. Then the hot billets are moved by gravity to the end of an inclined roller conveyor and into a forging machine. Positioning is accomplished by mechanical stops. After a series of operations, the castings are ejected from a forming machine onto a small loading platform from which they are loaded automatically onto standard stirrup-shaped conveyors that carry them a considerable distance to cool them.

"The shells are then carried two at a time to lathes for rough turning and are loaded automatically. This machine is in two parts and is like a pair of automatic chucking machines turned end upward so that the shells rotate in a vertical position. The loading is done by a large rotary device that stands between the two turning parts. Two shells at a time are grasped in a retractable holding mechanism. When this mechanism retracts, the whole device rotates a quarter turn and the shells are held in place to be positioned by the turning machine's center points. Each machine accommodates eight shell casings at a time and performs the identical operation on each pair of shells simultaneously.

Fig. 21. Belt conveyors are effective for units not suited for contact with conveyor rolls. The solid surface permits handling small parts.

"In the nose-forming operation that follows, the nose of the casing is heated by electrical induction so that the nose is red-hot and base is relatively cool. The casing then passes through a press that rough forms the nose. The shell is removed from the continuously moving conveyor belt for inspection and replaced on the belt by a simple lever. The casings undergo more turning, drilling and threading operations, all of which are performed on machines very similar to the rough turning machine. All of these machines are in pairs with a single automatic loading device between each pair. Some are monitored; others require no continuous inspection. The casings then pass through a low temperature oven to relieve stress.

"The plant was designed to operate on a five-day week and is shut down every Friday. Since the annealing requires three or four hours, however, and the shells would be ruined if allowed to cool in the meantime, the last shell casing must thus be put into the oven several hours before the plant closes. As the casings push each other through the oven, it is necessary to substitute dummy casings during the last hours on Friday so that real casings will not

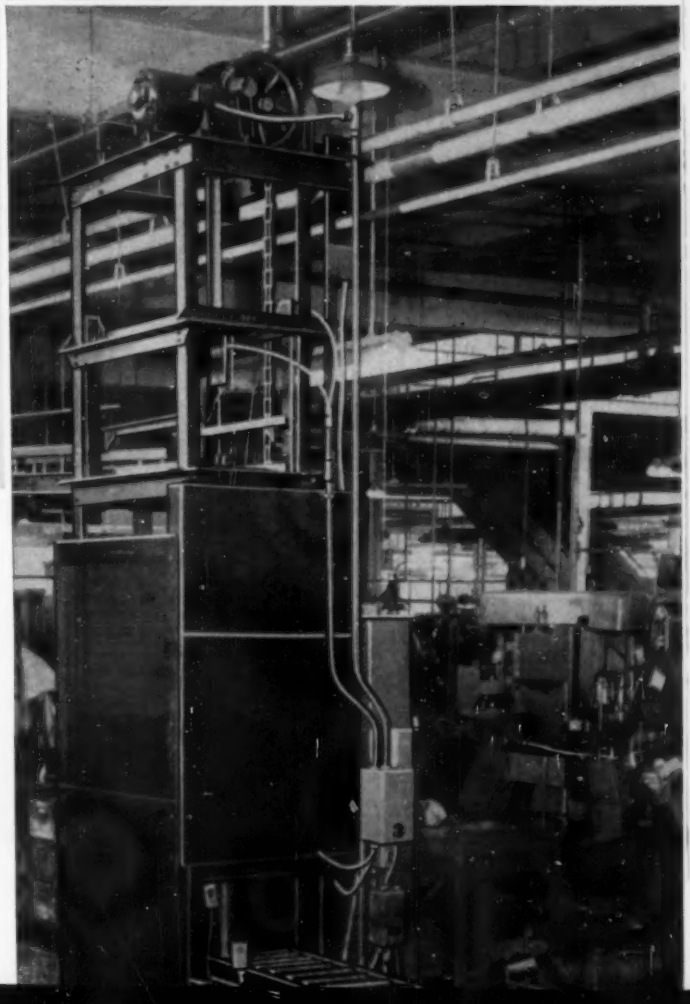


Fig. 22. (above) Apron conveyors are most suitable for handling material where there is a definite loading shock or where weight is too great for efficient handling by belt conveyor.

Fig. 23. (upper right) Wheels have been fitted into this roller conveyor to make possible a transfer in direction of materials movement.

Fig. 24. (right) Vertical lifts are economical and conserve floor space.

be left in the oven when it is shut off. The real casings are diverted to a long rack about two stories high. It has a series of tracks on which the conveyors move and an automatic elevator device for moving the conveyors to different levels. It is filled gradually on Friday afternoons and emptied on Monday mornings.

"This rack is close to the ideal in-process inventory mechanism needed for automatic production. It does not require human attention: the loading and unloading devices have the necessary automatic

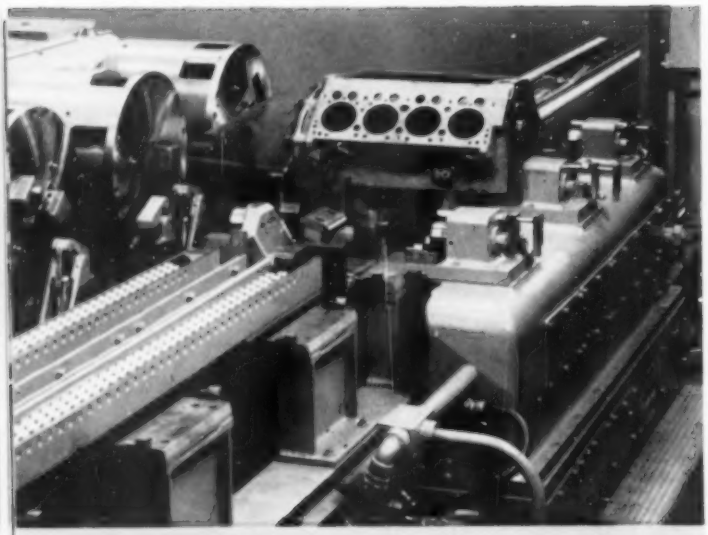


Fig. 25. (above) This transfer machine for an automotive company has built into it provisions for handling the workpiece so that the operator need only load and unload.

Fig. 26. (below) The transfer bar in this large automatic machine moves the workpiece from station to station. At predetermined stations the unit is turned, revolved or positioned at an angle.

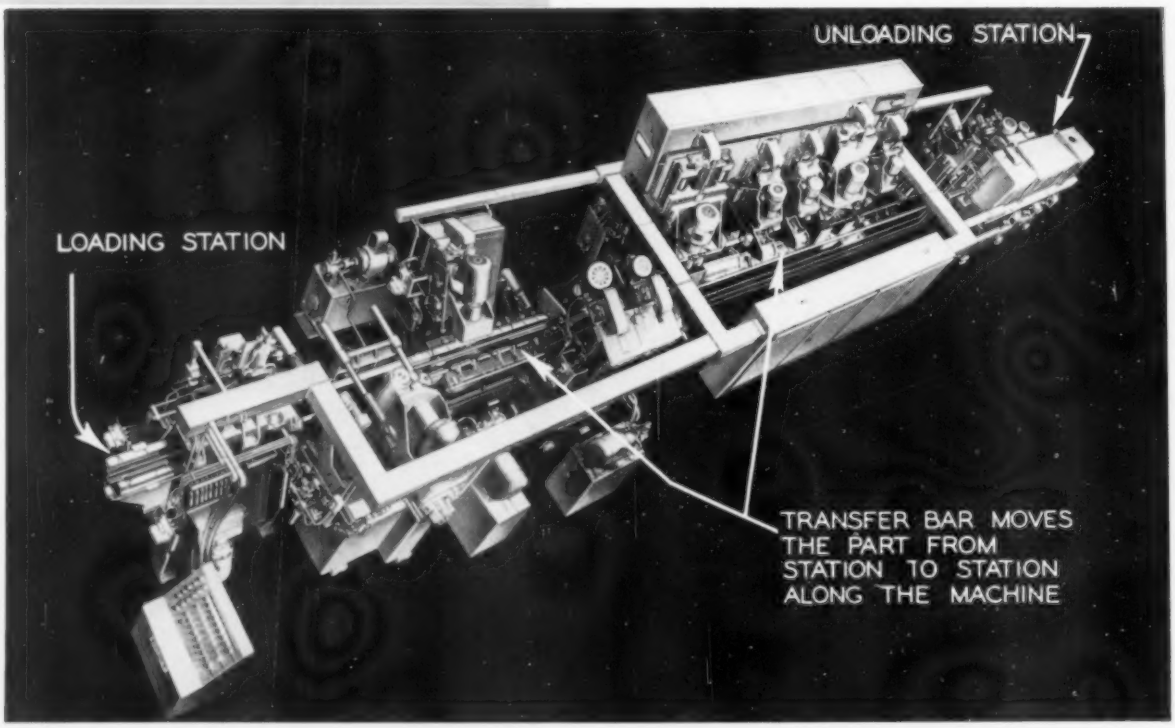
controls built into them."

In other cases, automation has not been carried to this extent. In *Figs.* 25 and 26 are shown two transfer machines built for the automotive industry. Each of these machines performs a specific function. Once the workpiece is loaded into the machine, no further attention is required until all of the prescribed operations have been performed. In each of these machines provisions have been made not only for moving the workpiece from station to station, but also for positioning it. In some cases, the workpiece is revolved, turned, or presented at an angle. In some of these transfer machines, the workpiece is turned over so that chips will be dumped from holes. In others, the unit is removed from the line for inspection and then replaced. As pointed out above, no operators are required for these operations.

Credits

Grateful acknowledgement is made to the following companies for material and photographs which are part of this article.

The Cross Co.
General Electric Co.
The Logan Co.
Rapids-Standard Co.
Snyder Tool and Engineering Co.
Jervis B. Webb Co.
D. Van Nostrand Co.
Westinghouse Electric Corp.
Yale and Towne Mfg. Co.



Cutting Feeds and Speeds for Standard Tools

THIS TABLE IS BASED on the use of high-speed tools and an average eight-hour tool life. Feeds are based on the use of multiple spindle type machines using both rough and finish forming tools on cold drawn material. On lighter single spindle machines using only one forming tool, feeds are usually much lower. The table is presented here by courtesy of Republic Steel Co.

Tool and Operation			AISI Grades of Steel							
			B1113		B1112, C1113, C1119		B1111 C1116		C1117 C1118	
TOOL NAME	Size of Hole—Inches	Width or Depth of Cut—Inches	Surface F.P.M.	Feed In./Rev.	Surface F.P.M.	Feed In./Rev.	Surface F.P.M.	Feed In./Rev.	Surface F.P.M.	Feed In./Rev.
Form—Circular or Dove-Tail		Width								
		.500	225	.003	165	.0025	155	.0023	150	.0022
		1.000	210	.0025	160	.002	150	.0019	145	.0018
		1.500	210	.0022	160	.0018	150	.0017	145	.0016
		2.000	205	.0018	155	.0015	146	.0014	141	.0014
		2.500	200	.0015	150	.0012	141	.0011	136	.0011
Twist Drills	.250		125	.0054	105	.0045	99	.0042	95	.0041
	.500		125	.006	105	.005	99	.0047	95	.0045
	.750		140	.007	115	.006	108	.0056	105	.0055
	1.000		140	.008	115	.007	108	.0066	105	.0064
	1.250		145	.009	120	.008	113	.0076	109	.0073
Box Tool Blades		Depth								
		.125	225	.0085	165	.007	155	.0066	150	.0064
		.250	210	.008	160	.0065	150	.0061	145	.0059
		.375	205	.0065	155	.0055	146	.0052	141	.0050
		.500	200	.0055	150	.0045	141	.0042	136	.0041
Hollow Mills		.062	200	.012	150	.010	141	.0094	136	.0091
		.125	186	.0096	140	.008	132	.0075	127	.0073
		.187	179	.0084	135	.007	127	.0066	123	.0064
		.250	172	.0073	130	.0065	122	.0061	118	.0059
Knurl Tools In Turret—Knurl	On		225	.020	165	.015	155	.014	150	.014
—Cross Slide	Off		225	.040	165	.030	155	.028	150	.028
			225	.020	165	.015	155	.014	150	.014
Chamfer & Facing			280	.008 to .010	200	.005 to .007	188	.0047 to .0066	182	.0045 to .0064
Reamers	under ½"		180	.0085	145	.007	136	.0066	132	.0064
	½" or over		180	.012	145	.010	136	.0094	132	.0091
Cut Off		Width								
		.062	225	.003	165	.002	155	.0019	150	.0018
		.125	230	.0035	175	.0025	164	.0023	160	.0023
		.187	235	.0035	180	.0025	169	.0023	164	.0023
		.250	250	.004	190	.003	179	.0028	173	.0027

—*Courtesy of Republic Steel Co*

Cutting Feeds and Speeds for Standard Tools (Continued)

Tool and Operation			AISI Grades of Steel															
			C1144*†		C1108 C1109, C1115 C1120, C1125 C1141*, C1151*		C1016, C1019 C1022, C1145*, B1010 4017, 4023, 4024		C1023, C1138, C1144 4032*, 5120		C1015, C1017 C1020, C1025, C1045*, C1137, C1140 3130*, 4028 4037*, 4130*, 5132* 5135*, 8630* E4132*†		C1010, C1012		C1030, C1035, C1090* C1141, C1151, C1146 2330*, 2335* 3135*, 4042*, 4137* 5045*, 5140*, 8615 8632*, 8635*, 8735* E4135*		C1108, C1145 2317, 3115, 3120 3140*, 4027, 4047* 4140*, 4142*, 4608 4615, 4620, 4621, 4640*, 5145*, 5147* 6145*, 8617, 8620 8622, 8637*, 8640* 8642*, 8720, 8740* 8742*, 9437*, 9440* 9442* E4137*	
TOOL NAME	Size of Hole—Inches	Width or Depth of Cut—Inches	Surface F.P.M.	Feed In./Rev.	Surface F.P.M.	Feed In./Rev.	Surface F.P.M.	Feed In./Rev.	Surface F.P.M.	Feed In./Rev.	Surface F.P.M.	Feed In./Rev.	Surface F.P.M.	Feed In./Rev.	Surface F.P.M.	Feed In./Rev.	Surface F.P.M.	Feed In./Rev.
Form—Circular or Dove-Tail		Width .500	140	.0021	135	.0020	130	.0019	125	.0019	120	.0018	120	.0015	115	.0017	110	.0016
		1.000	136	.0017	130	.0017	125	.0016	121	.0015	115	.0014	115	.0012	112	.0014	106	.0013
		1.500	136	.0015	130	.0015	125	.0014	121	.0014	115	.0013	115	.0011	112	.0013	106	.0012
		2.000	132	.0013	127	.0012	121	.0012	117	.0011	112	.0011	112	.0009	108	.0011	102	.0010
		2.500	127	.001	122	.0010	117	.0009	113	.0009	108	.0009	108	.0007	105	.0008	99	.0008
Twist Drills	.250		89	.004	86	.0040	82	.0038	79	.0037	76	.0035	76	.0031	73	.0034	69	.0033
	.500		89	.0045	86	.0045	82	.0043	79	.0042	76	.004	76	.0034	73	.0038	69	.0036
	.750		98	.0055	94	.0054	90	.0052	87	.0050	83	.0047	83	.0041	80	.0045	76	.0044
	1.000		98	.0064	94	.0063	90	.006	87	.0058	83	.0055	83	.0048	80	.0053	76	.0051
	1.250		102	.007	98	.0072	94	.0068	91	.0066	86	.0064	86	.0055	84	.0062	79	.0058
Box Tool Blades		Depth .125	140	.0059	135	.0057	130	.0055	125	.0052	120	.005	120	.0042	115	.0049	110	.0046
		.250	136	.0055	130	.0053	125	.0051	121	.0049	115	.0047	115	.0039	112	.0045	106	.0043
		.375	132	.0047	127	.0045	121	.0043	117	.0041	112	.004	112	.0033	108	.0038	102	.0036
		.500	127	.004	122	.0037	117	.0035	113	.0034	108	.0032	108	.0027	105	.0031	99	.0030
Hollow Mills		.062	127	.0085	122	.0081	117	.0078	113	.0075	108	.0072	108	.0060	105	.007	99	.0066
		.125	119	.0068	114	.0065	109	.0062	106	.0060	101	.0058	101	.0048	98	.0056	92	.0053
		.187	115	.006	110	.0057	105	.0055	102	.0053	97	.005	97	.0042	95	.0049	89	.0046
		.250	110	.0055	106	.0053	102	.0051	98	.0049	94	.0047	94	.0039	91	.0045	86	.0043
Knurl Tools In Turret — On			140	.012	135	.012	130	.012	125	.0110	120	.011	120	.009	115	.011	110	.0099
Knurl Tools In Turret — Off			140	.024	135	.025	130	.024	125	.0220	120	.022	120	.018	115	.022	110	.0198
Knurl—Cross Slide			140	.012	135	.012	130	.012	125	.0110	120	.011	120	.009	115	.011	110	.0099
Chamfer & Facing			170	.005-.0072	163	.0045-.0063	156	.0047-.0066	151	.0042-.0058	144	.004-.006	144	.0034-.0048	140	.004-.006	132	.0038-.0053
Reamers	under ½"		123	.006	118	.0057	113	.0055	110	.0053	104	.005	104	.0042	102	.0049	96	.0046
	½" or over		123	.0085	118	.0081	113	.0078	110	.0075	104	.0072	104	.0060	102	.007	96	.0066
Cut Off		Width .062	140	.0017	135	.0016	130	.0016	125	.0015	120	.0015	120	.0012	115	.0014	110	.0013
		.125	149	.0021	142	.0020	136	.0019	132	.0019	126	.002	126	.0015	122	.0017	116	.0016
		.187	153	.0021	147	.0020	140	.0019	136	.0019	130	.002	130	.0015	126	.0017	119	.0016
		.250	161	.0025	155	.0024	148	.0023	144	.0022	137	.0024	137	.0018	133	.0022	126	.0020

*Annealed

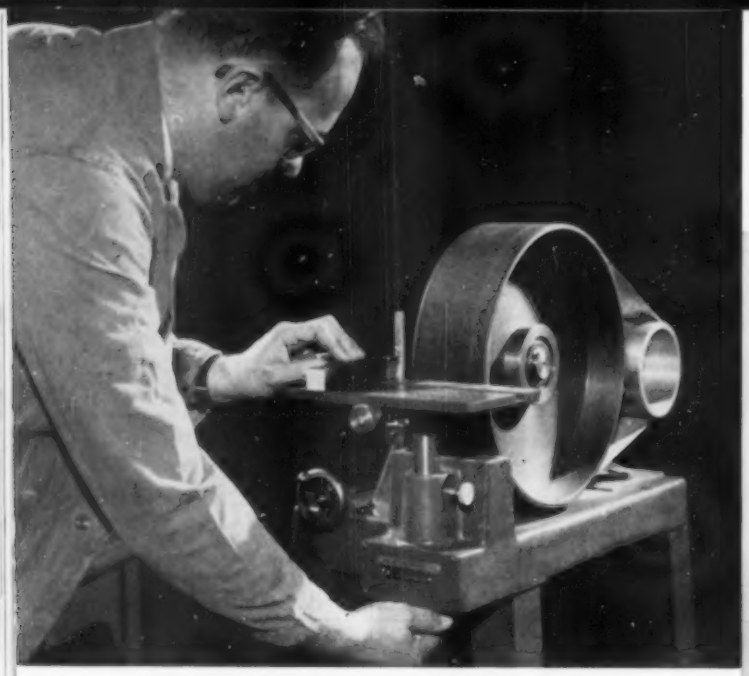
†C1144, annealed, can be machined at about 10 percent higher speeds than shown if the feeds are lowered accordingly.

‡These steels may be machined at 120 surface feet per minute with feeds as given or at 100-110 surface feet per minute with 10-20 percent heavier feeds.

Cutting Feeds and Speeds for Standard Tools (Continued)

TOOL AND OPERATION			AISI Grades of Steel															
			C1040, C1043 3141*, 3145*, 4145* 4147*, 5150*, 5152* 8625, 8627, 8645*, 8745*, 9445*, 9747* E4617, E4620		1330*, 1335*, 3150* 4150*, 4317*, 4320* 6150*, 6152*, 8647* 8650*, 8747*, 8750*		C1045 1320, 1340* 2340*, 3130, 4340* 5130, 6120, 8655*		C1050 2330, 3135, 8660* 9255*, 9763 E4337*		C1055*, C1060* 2335, 2345* 2515*, 4063*, 4812* 4815*, 9840*, 9260 E2512*, E2517* E3310*, E4640*, E9310*		C1065*, C1070* 4068*, 4817*, 4820* 9261*, 9262*, 9845* E3316, E9315*, E9317*		C1080* C1085*, C1095* 3140 E50100		3141 E51100 E52100*	
TOOL NAME	Size of Hole—Inches	Width or Depth of Cut—Inches	Surface F.P.M.	Feed In./Rev.	Surface F.P.M.	Feed In./Rev.	Surface F.P.M.	Feed In./Rev.	Surface F.P.M.	Feed In./Rev.	Surface F.P.M.	Feed In./Rev.	Surface F.P.M.	Feed In./Rev.	Surface F.P.M.	Feed In./Rev.	Surface F.P.M.	Feed In./Rev.
Form—Circular or Dove-Tail		Width .500	105	.0015	100	.0015	95	.0014	90	.0014	85	.0013	80	.0012	70	.0011	65	.0010
		1.000	101	.0012	96	.0012	91	.0012	87	.0011	83	.0010	78	.0009	68	.0008	63	.0008
		1.500	101	.0011	96	.0011	91	.0010	87	.0010	83	.0009	78	.0008	68	.0007	63	.0007
		2.000	98	.0009	93	.0009	88	.0009	84	.0008	80	.0008	75	.0007	66	.0006	61	.0006
		2.500	95	.0007	90	.0007	85	.0007	81	.0007	77	.0006	73	.0006	64	.0005	59	.0005
Twist Drills	.250		67	.0032	63	.0031	60	.0028	57	.0028	54	.0027	51	.0025	45	.0023	41	.0022
	.500		67	.0035	63	.0034	60	.0031	57	.0031	54	.0030	51	.0028	45	.0025	41	.0024
	.750		73	.0042	69	.0041	65	.0037	62	.0037	59	.0035	56	.0033	49	.0030	45	.0029
	1.000		73	.0049	69	.0048	65	.0044	62	.0044	59	.0041	56	.0038	49	.0035	45	.0034
	1.250		76	.0056	72	.0055	68	.0050	65	.0050	62	.0047	58	.0044	51	.0040	47	.0038
Box Tool Blades		Depth .125	105	.0044	100	.0042	95	.0040	90	.0038	85	.0036	80	.0034	70	.0030	65	.0028
		.250	101	.0041	96	.0039	91	.0037	87	.0035	83	.0033	77	.0031	68	.0027	63	.0026
		.375	98	.0034	93	.0033	88	.0031	84	.0030	80	.0028	75	.0026	66	.0023	61	.0022
		.500	95	.0028	90	.0027	85	.0026	81	.0024	77	.0023	73	.0021	64	.0019	59	.0018
Hollow Mills		.062	95	.0063	90	.0060	85	.0057	81	.0054	77	.0051	73	.0047	64	.0042	59	.0040
		.125	89	.0050	84	.0048	80	.0046	76	.0043	73	.0041	68	.0038	60	.0034	55	.0032
		.187	86	.0044	81	.0042	77	.0040	73	.0038	70	.0036	65	.0034	57	.0030	53	.0028
		.250	83	.0041	78	.0039	74	.0037	70	.0035	67	.0033	63	.0031	55	.0027	51	.0026
Knurl Tools In Turret — On			105	.0094	100	.0090	95	.0085	90	.0089	85	.0075	80	.0070	70	.0060	65	.0060
Knurl Tools In Turret — Off			105	.0188	100	.0180	95	.0170	90	.0178	85	.0150	80	.0140	70	.0120	65	.0120
Knurl—Cross Slide			105	.0094	100	.0090	95	.0085	90	.0089	85	.0075	80	.0070	70	.0060	65	.0060
Chamfer & Facing			127	.0036-.0050	120	.0034-.0048	114	.0035-.0048	108	.0031-.0043	103	.003-.0042	97	.0028-.0038	85	.0025-.0035	79	.0024-.0034
Reamers	under ½"		92	.0044	87	.0042	83	.0040	78	.0038	75	.0036	70	.0034	62	.0030	57	.0028
	½" or over		92	.0063	87	.0060	83	.0057	78	.0054	75	.0051	70	.0047	62	.0042	57	.0040
Cut Off		Width .062	105	.0012	100	.0012	95	.0011	90	.0011	85	.0010	80	.0009	70	.0008	65	.0008
		.125	112	.0015	105	.0015	100	.0014	95	.0013	90	.0012	85	.0012	74	.0011	69	.0011
		.187	115	.0015	108	.0015	103	.0014	98	.0013	93	.0012	87	.0012	77	.0011	71	.0011
		.250	121	.0019	114	.0018	108	.0017	103	.0016	98	.0015	92	.0014	81	.0012	75	.0012

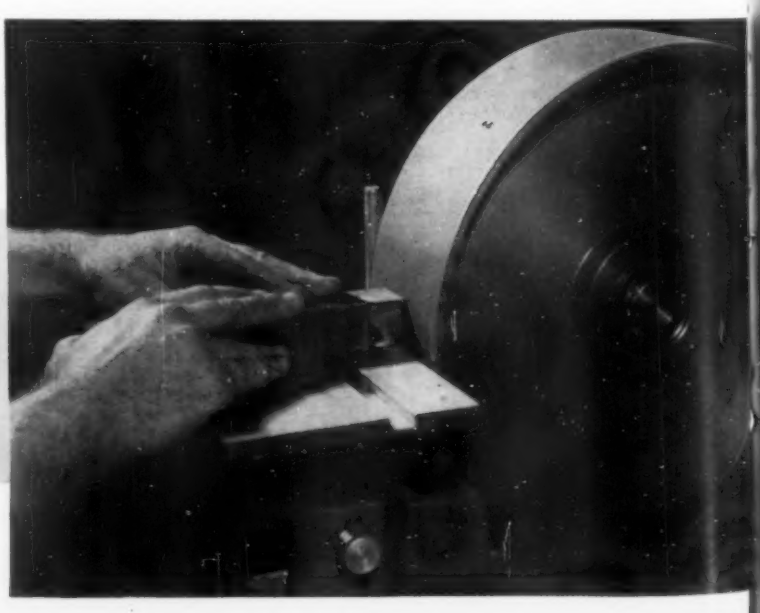
*Annealed



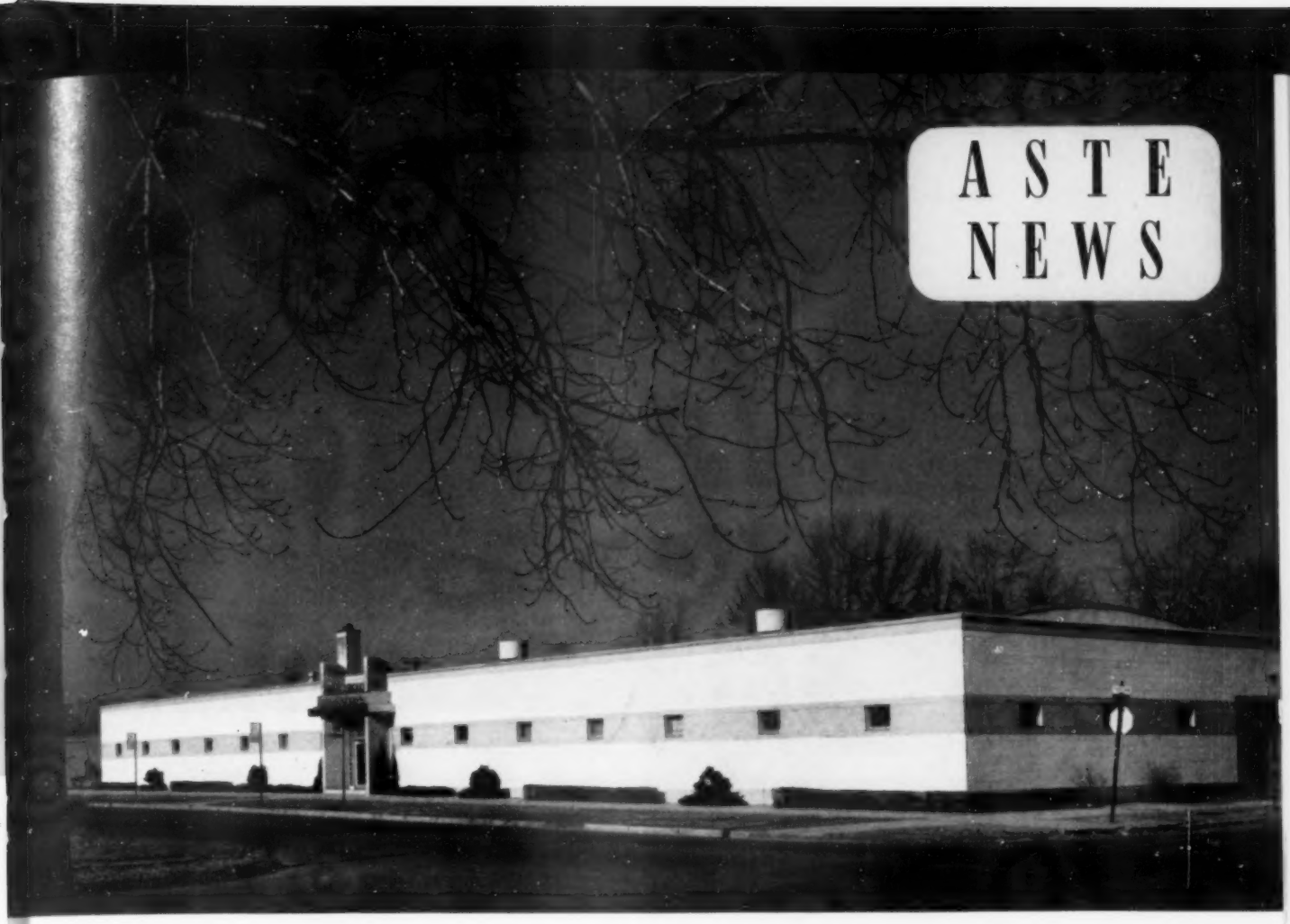
Abrasive-Belt Sharpens Carbide Tools

SHARPENING TUNGSTEN-CARBIDE tools with a silicon carbide belt costs approximately 2/3 less per tool sharpened than the conventional diamond-wheel method. A result of cooperative engineering between Behr-Manning Corp. of Troy, N. Y. and Fenlind Engineering Co. of Rockford, Ill., the machine for the new method uses a coated abrasive belt that travels over a cast iron contact wheel.

Field tests show that belt costs for sharpening tungsten-carbide tool bits range between one and three cents per tool whereas the conventional method costs 6 to 17 cents. In addition the tools have produced two to three times the number of pieces per tool required. Intermediate grinding and the finish honing operations are not necessary. After the clearance angle has been rough-ground on the tool with a silicon carbide wheel, the relief angle and final cutting surface can be micro finished in one operation with the coated abrasive belt. A finish of 2-16 microinches rms is put on the tool by a 220-grit belt. The method of setting the relief angle on the cutting tool with this machine is new to the tool grinders' trade, and reflects simple but ingenious design. The relief angle is set by adjusting the height of the table until the face of the cutting tool contacts the belt on the periphery of the contact wheel at a point on its curvature that corresponds to the tool relief angle desired. A vertical gage, marked in degrees from 1 to 22, is accurately mounted near the table at the left of the wheel. Proper table height is established for a desired relief angle by aligning the cutting edge of the carbide tip with the correct angle marking on the vertical gage as shown in the illustration above.



Curvature of contact wheel produces relief angle desired and corresponds to the angle marked on the calibrated post.



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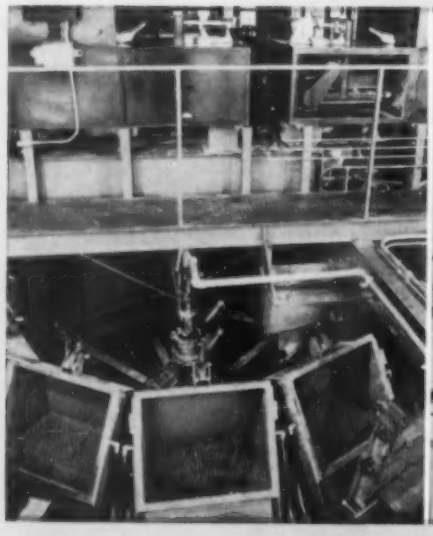
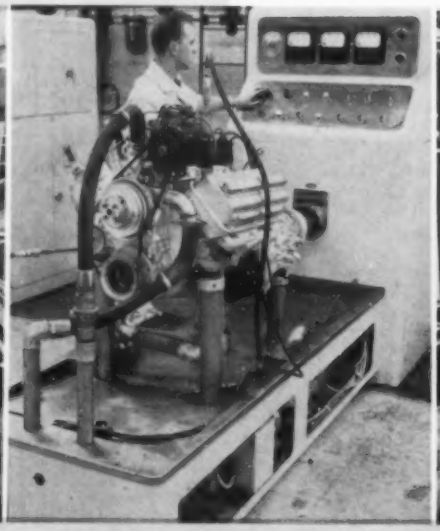
On the Plymouth assembly line a body is about to be lowered into place on a chassis in which the engine is already mounted.

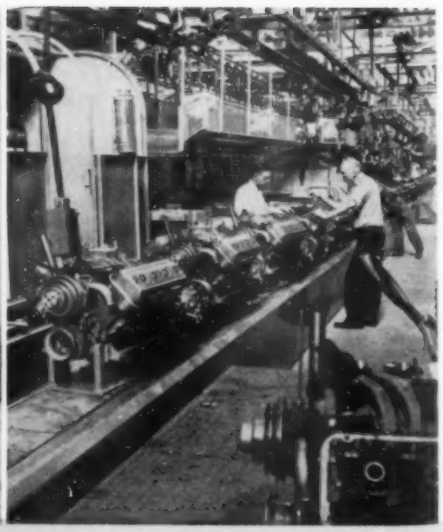
Clear and transparent plate glass is inspected for possible defects after leaving the polishing line in the Rouge Glass Plant of the Ford Motor Co.



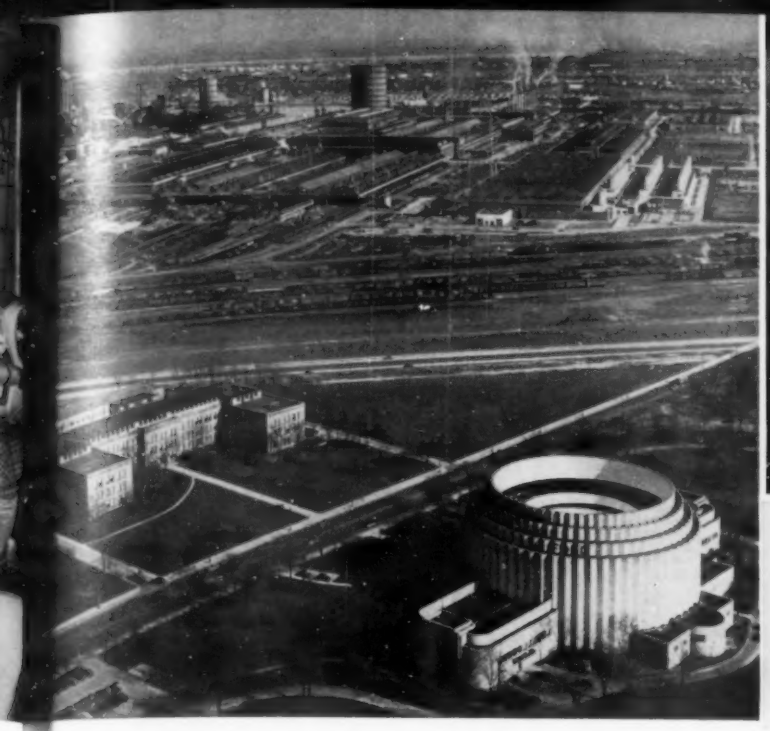
Part of a mass production rotary shell molding machine at Mechanical Handling Systems, Inc. Twelve large patterns can be handled at the same time.

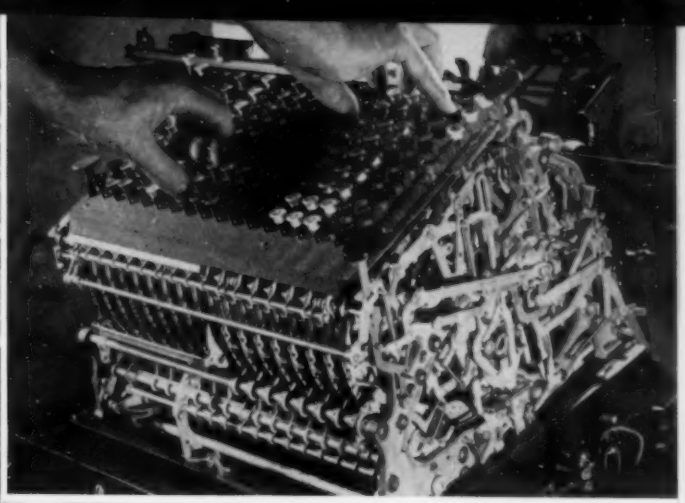


Following final assembly, every DeSoto V-8 engine is thoroughly checked. Test stands can be set to run through the cycle automatically at this up-to-date engine plant.



In DeSoto's new engine plant, the engines on the assembly line are mounted on metal plates which permit the workmen to swing the engine into proper position.





Thousands of precision-made parts are assembled by highly skilled workmen to produce the business machines made by Burroughs Adding Machine Co.

This aerial view of the Ford Motor Co.'s Rouge plant shows the boat docks and adjacent storage bins.

Outstanding Lectures and Plant Tours Offered on Annual Meeting Program

By Nancy L. Morgan

First-hand knowledge of the latest manufacturing methods employed by Detroit industry will be available for Society members participating in the plant tours scheduled for the 21st Annual Meeting. A total of 13 tours will enable ASTE visitors to observe operations at seven firms: De Soto and Plymouth Divisions of Chrysler Corp., Rouge assembly and glass plants of the Ford Motor Co., Ternstedt Division of General Motors Corp., Burroughs Adding Machine Co., and Mechanical Handling Systems, Inc.

At De Soto members will see the V-8 engine plant, one of the most modern in the automotive industry. So complete is the installation of automatic machinery and materials handling equipment that hand labor has practically disappeared. Many of the machines, once set in operation, do their own "thinking" and all of the machines do their work with precision. Everything that moves is moved electrically, hydraulically or mechanically.

The Plymouth tours will take ASTE visitors through the assembly plant where all of the operations necessary in building the Plymouth automobile for 1953 will be viewed. Members will see superfinishing of brake drums to increase braking efficiency; cylinder block machining where the blocks and manifold are sandblasted, milled and drilled to meet specific conditions before actual assembly; and the plating room where all nuts and bolts and many other parts for Plymouth cars are thoroughly protected against rust.

The Ford Motor Co., the only automobile manufacturer to make and fabricate its own safety glass, will conduct ASTE tours of its Rouge glass plant—where yearly production of plate glass is equal to a ribbon, four feet wide, stretched from New York City to New Orleans.

The plant covers five acres of ground and provides more than 255,000 square feet of floor space. Operation at this Ford plant, started in the early 1920's, was the first in the glass industry to turn out plate glass through a continual process.

Society members will also tour the Ford assembly plant at Rouge, known as the world's largest industrial city. The plant has a maximum production capacity of 495 units every eight hours and employs more than 4,300 persons.

Other vitally interesting plants to be visited during the annual meeting are: Mechanical Handling Systems, Inc., where the Rotary Shell Molding machine which handles 12 large patterns at one time will be shown; Burroughs Adding Machine Co., where much of the nation's office equipment is manufactured; and Ternstedt Division of General Motors, where automobile hardware for GM cars is made.

Technical sessions at the 21st annual meeting of the Society will include 21 papers, two panel discussions and a forum. Increased production and lower costs is the theme for the subjects to be discussed at these meetings. The papers to be presented cover a range from automatic manufacturing to particular techniques in the metalworking field.

Technical Sessions

The application of modern control techniques to automatic manufacturing will be featured in the paper, "Automation of the Factory," to be delivered by J. Y. Kaplan of the Arma Corp. Complete use of existing industrial machine is made possible by the logical integration into the factory of servomechanisms and brain block units. These devices have been proved worthy and reliable in numerous complex military installations and applications.

The fundamental concepts underlying the modern techniques of automatic control are treated in a manner which should provide valuable assistance to those who will participate in the synthesis of future factories. Many techniques are discussed with reference to particular industrial applications.

A plan to control maintenance expenses in industry will be presented by E. E. Griffiths, Westinghouse Electric Corp., in a paper entitled "Maintenance Expense Control of Tools, Dies, Fixtures and Equipment." Mr. Griffiths will outline at the meeting a method which is presently being used at Westinghouse, along with charts and graphs to show the success of the operation. The program provides for a detailed history of performance for each item which can be used by the foreman to control maintenance costs. Emphasis is placed on preventive maintenance rather than on trouble shooting. Detailed charts have been constructed, along with procedures for the proper administration of the program.

A two-part paper, "Production Uses of Adhesive-Bonded Joints," is concerned with metal-to-metal bonding and rubber bonding. It will be presented by O. W. Loudenslager, Goodyear Aircraft Corp., and J. H. Gerstenmaier, Goodyear Tire and Rubber Co. The first part contains a brief historical review of the process as well as a description of the procedure used in producing metal-to-metal bonded joints. Physical and chemical properties including design allowances will be discussed. Examples will include applications in the aircraft and other fields.

The second part of the paper will cover in considerable detail the various methods of obtaining adhesion of rubber to all types of metal. Bond loads to be expected under various operating conditions with different combinations of rubber, synthetic rubber and metals is another phase to be presented. The author will discuss the overall design of rubber-to-metal parts.

Wax lubricants for metalworking is a controversial subject which A. E. Budner, George L. Boehm and James B. Carse, S. C. Johnson and Son, Inc., will attempt to clarify in their joint paper, "Use of Wax-Base Products in Metal Forming and Machining." This paper contains a summary of some of the research and wax technology which has been accumulated, along with a description of the chemical properties of waxes, wax ingredients, and applications for which they are suitable.

Reporting on "Advances in Precision Boring," R. S. Hahn of the Heald Machine Co. will discuss such fundamental problems as tool life, chatter and elastic effects, along with the design of quills. The function of coolants as dampening media is also included. The relation between elastic misalignment effects and the boring quill and workpiece will be shown, as well as the effect of two-way boring and its attendant difficulties. Mr. Hahn will also discuss some aspects of tool life under interrupted cuts.

The limitations of bending and contour forming caused by the development of tensions on the outer surface is the subject of the paper, "Stress Considerations in Contour Forming," by Dr. George Sachs, Director of Metallurgical Research, Syracuse University. Recent investigations have revealed that metal may fail and the process of curving be limited by either uniform stretching leading to rupture or by local stretching leading to the phenomenon of necking, as in a tensile test. The radius of curvature and, more significantly, the strain at the outer surface which can be obtained largely depends on the type of failure, which in turn depends on the cross section contour and dimensions. In addition, both the necking strain and the rupture strain of the metal also vary with the cross section. This makes the prediction of permissible or minimum bend radii for contour forming sections a complex problem. The paper will be illustrated with experimental examples.

Hydraulic feedback control systems as presently used for the control of machine tools will be emphasized in the session on "Equipment and Tooling for Contour Forming," by O. C. Turchan, the Turchan Follower Machine Co. The topic under discussion will go beyond the basic concept of automatic controls to include some of the implications of their introduction into industry. The author says that automatic controls are not primarily an economic measure, but a necessity dictated by the increasing demand for accuracy in modern services and manufactured products.

Norman Zlatin of Metcut Research Associates has written a paper on "Microstructure as an Index to Machineability." In it he says that considerable savings in machining costs are attainable through consideration of the microstructure of the metal to be cut. In general, machineability ratings of metals have been based only on their compositions and hardnesses. In recent years it has been found that the type of microstructure is the factor which governs the machining properties of the metal. For example, each grade of steel has a range of machineability ratings as great as the range of structures obtainable with that particular steel. According to the author the machining properties of cast iron, jet engine alloys and even titanium are also related to the microstructure of the metal.

"Tool Engineering Applications of Titanium Carbide Alloys" is the title of the paper to be presented by W. L. Kennicott, Kennametal, Inc. The characteristics of titanium carbide alloys will be discussed briefly, with emphasis on the physical and mechanical properties of the various alloys and how they affect tool design and tool construction. Applications for metal cutting, metal forming, dies and jigs and fixtures will be illustrated with examples. The speaker will include his concept of the future field for these alloys.

The causes and correction of unbalance is the theme for the paper on "Precision Production Balancing" by George C. Lawrie, the Tinius Olsen Testing Machine Co. He will illustrate how some of the production balancing machines manufactured by his company are built and how they function.

Describing the principles involved in the design of the main types of parts

Andrew Carnegie
Host Chapter
Chairman

Frank Curtis
Technical Sessions

Ben F. Bregi
Technical Activities

B. F. Estell
Social Program

C. M. Smillie
Banquet

E. D. Wiard
Host Chapter
Vice Chairman

H. W. Rath
Supplementary
Functions

J. N. Failing
Entertainment

R. LaPierre
Budgets

R. E. Cross
Plant Tours

N. Kondur
Emergency

D. L. Harris
Sessions
Arrangements

J. A. Arnott
Reception

W. S. Patton
Publicity

Mrs. Andrew Carnegie
Ladies Activities

C. P. Nelson
Transportation

C. P. Bidle
Housing

A. L. Caplan
Records and
Reports

M. W. Davis
Registration

Detroit chapter members who are serving as activities chairmen are shown here with the committees they head. Missing is Fred M. Wall, tickets. Host chapter chairman is Andrew Carnegie and Monta O. Cox is host chapter representative on the National Program Committee.

J. B. Picard
Signs

sorters and feeders, the paper, "Principles of Automatic Sorting and Feeding," by J. H. Paquin, tool engineering consultant, will note the points of dissimilarity between these types. Among the parts feeders to be included are oscillating blade, rotary, oscillating tube, vibratory, tumble, stack, frictional, paddle, flexible arm, endless belt, rotating blade, and centrifugal types.

A paper entitled "Carbide Flame-Plating" by Warren L. Donnelly of the Linde Air Products Co. will describe the features of this new service which is the application of undiluted coatings of powder metals such as tungsten carbide to metal parts. Properties of the coating will be covered, as well as the results of comparative wear tests. Examples of applications will be shown.

Wire stitching is one of the newer methods of fastening now in use in industry. Arthur G. Denne, the Acme Steel Co., in his paper, "Manufacturing Applications of Metal Stitching," explains the technique and describes the equipment employed. A second part of Mr. Denne's talk will be devoted to standard manufacturing applications with case histories for illustration, and a third section will discuss the benefits of wire stitching and its effectiveness in instances where unique conditions make it particularly suitable.

John W. Lengbridge, Aluminum Goods, Ltd., will introduce his paper with a brief historical sketch of drawing and spinning techniques. This session, "An Evaluation of Drawing vs. Spinning" will include a discussion of the economics involved in selecting one or the other method for a particular job as well as the types of work which can be done best by each technique. Illustrations will show the fabrication of parts by both spinning and drawing and the machinery used.

The first panel discussion of the meeting will have as its main subject "Problems in Production Welding." The second panel will consider "Problems in Thread Production."

leadership

ASTE National Headquarters Dedication

Every chapter of the Society will be represented at the dedication of the national headquarters building to be held on March 16. National ASTE officials and many of the members who had served on the special housing committees will participate in the ceremonies. Officers from other societies, civic and government leaders from the Detroit area will also be on hand.

The headquarters building, made possible by the financial support of 133 members and chapters who purchased ASTE Building Fund Participation Certificates, was completed in October, 1948. The last of the building certificates were retired in September, 1950, just a little more than two years after the original issue.

A special salute is due all those members who helped make the ASTE home a reality. Well-deserved praise goes to those who purchased building certificates and to the following men who served on the special committees.

Housing Committee

A. M. Sargent, Chairman
Harry E. Conrad
W. B. Peirce
Grant S. Wilcox, Jr.

Housing Finance Committee

Ray H. Morris, Chairman
C. V. Briner
George A. Goodwin
W. B. Peirce
A. M. Sargent
H. L. Tigges

national day

monday, march 16

9 A.M.
Breakfast
Hotel Statler

11 A.M.
Dedication of ASTE Building

11:30 A.M.
Tour of ASTE Building

1 P.M.
Luncheon
Engineering Society of Detroit
Rackham Building

2:30 P.M.
Leadership Session
Engineering Society of Detroit
Rackham Building

5 P.M.
Recess

6 P.M.
President's Reception
Hotel Statler

6:30 P.M.
Conference Dinner
Hotel Statler

conference

chapter day

tuesday, march 17

8:30 A.M.
Breakfast
Hotel Statler

9:45 A.M.
Leadership Session
Hotel Statler

10:45 A.M.
Leadership Session
Hotel Statler

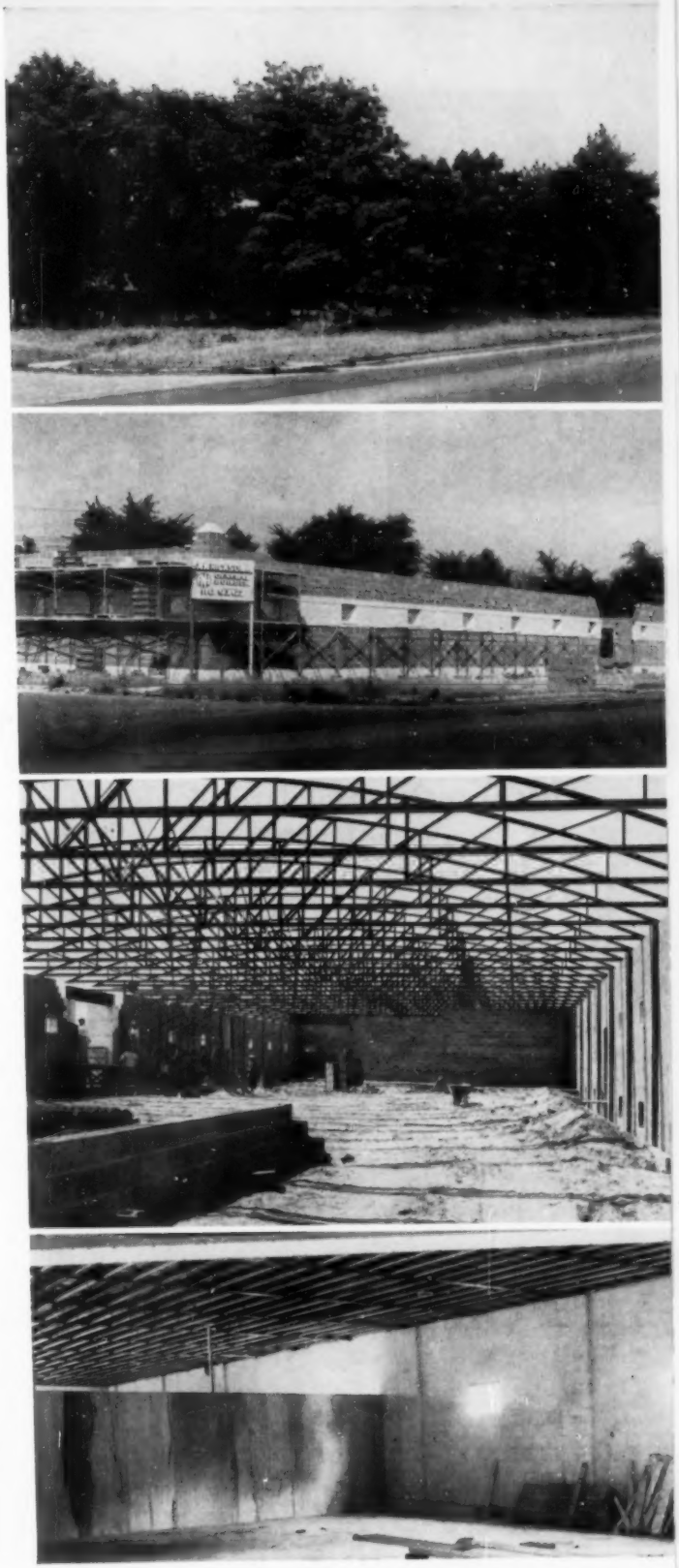
12:30 P.M.
Luncheon
Hotel Statler

2 P.M.
Discussion Groups
Hotel Statler

4:30 P.M.
Recess

6:30 P.M.
Officers and Directors Reception
Hotel Fort Shelby
Shelby Room

7 P.M.
Leadership Banquet
Hotel Fort Shelby
Crystal Ballroom



Four stages in the construction of the National Headquarters building. Built of cinder block and steel, the structure is fireproof, air conditioned and scientifically lighted.

annual meeting

J. H. McBurney

R. H. Sullivan

J. E. Weldy

S. E. Bergstrom

H. K. Work

R. P. Baker

What Can Our Standard of Living Be Tomorrow?

A topic of vital interest to all Americans in these critical times, this question will be discussed by a panel of experts representing five phases of industry in an opening day forum on March 18.

Moderator of the forum, which will take place at 8 p.m. at the Statler Hotel, will be Dr. J. H. McBurney, Dean of the School of Speech at Northwestern University and well-known as the moderator of the nationwide radio program "Northwestern Reviewing Stand."

Participants are leaders in the fields of national manufacturing, goods distribution, education and economics. They are: Dr. Ray Palmer Baker, Vice President, Rensselaer Polytechnic Institute; Swan E. Bergstrom, Vice President, Cincinnati Milling and Grinding Machines, Inc.; Ray H. Sullivan, Vice President in charge of the Engine and Pressed Steel Group, Ford Motor Co.; J. E. Weldy, Manager of Marketing, Carboloy Dept., General Electric Co., and a Member of Producers Goods Marketing Committee; and Dr. H. K. Work, Director of Research, College of Engineering, New York University.

Wednesday, March 18

8 A.M.

Registration for Plant Tours and Technical Sessions

Ballroom Floor
Hotel Statler

9 A.M.

Plant Tours—Buses leave Hotel Statler for Rouge Assembly Plant, Ford Motor Co.; Rouge Glass Plant, Ford Motor Co.; Automotive Hardware Mfg., Ternstedt Div., General Motors Corp.

9:30 A.M.

House of Delegates Meeting

Wayne Room, Hotel Statler

1 P.M.

Technical Sessions

Bagley Room, Hotel Statler

Production Uses of Adhesive Bonded Joints—"Properties, Processes and Uses of Metal Bonding Adhesives" by O. W. Loudenslager, Manager of Research and Development Dept., Goodyear Tire and Rubber Co.

"Bonding Methods for Adhering Rubber to Metal" by J. H. Gerstenmaier, Development Manager, Molded and Extruded Goods Plant, Goodyear Tire and Rubber Co.

Crystal Ballroom, Hotel Sheraton-Cadillac

Principles of Automatic Sorting and Feeding by J. H. Paquin, Tool Engineering Consultant.

Italian Gardens, Hotel Sheraton-Cadillac

Stress Considerations in Contour Forming by Dr. George Sachs, Director of Metallurgical Research, Syracuse University.

program . . .

3 P.M.

Panel Discussion

Problems in Production Welding
Grand Ballroom, Hotel Statler

Moderator: Michael Pinto, President, Douglas Tool Co.

Panel Speakers: R. H. Bennewitz, Assistant District Manager, Linde Air Products Co.; A. F. Boucher, District Manager, The Lincoln Electric Co.; Charles Bruno, Chief Welding Engineer, Products and Applications Dept., Reynolds Metals Co.; F. E. Kessler, Welding Equipment and Supply Co.; J. F. Randall, Supervisor, Welding Development Section, Manufacturing Engineering office, Ford Motor Co.; E. J. Zulinski, Chief Electrical Engineer, Progressive Welder Co.

8 P.M.

Forum Discussion

What Can Our Standard of Living Be Tomorrow?
Grand Ballroom, Hotel Statler

Moderator: Dr. James H. McBurney, Dean of the School of Speech, Northwestern University.

Forum Speakers: Dr. Ray Palmer Baker, Vice President, Rensselaer Polytechnic Institute; Swan E. Bergstrom, Vice President, Cincinnati Milling and Grinding Machines, Inc.; Ray H. Sullivan, Vice President, Engine and Pressed Steel Group, Ford Motor Co.; J. E. Weldy, Manager of Marketing, Carboloy Dept., General Electric Co., and Member of the Producers Goods Marketing Committee; Dr. H. K. Work, Director of Research, College of Engineering, New York University.

Technical Sessions
Crystal Ballroom, Hotel Sheraton-Cadillac

What We Can Learn From Europe About Productivity by Burnham Finney, Editor, *American Machinist.*

Thursday, March 19

8 A.M.

Registration for Plant Tours and Technical Sessions
Ballroom Floor
Hotel Statler

9 A.M.

Plant Tours—Buses leave Hotel Statler for Assembly Operations, Plymouth Div., Chrysler Corp.; V-8 Engine Plant, DeSoto Div., Chrysler Corp.; Shell Moulding Machines, Mechanical Handling Systems, Inc.; Rouge Glass Plant, Ford Motor Co.; Rouge Assembly Plant, Ford Motor Co.

Cadillac Square is the heart of downtown Detroit. One of the landmarks of the city is the mooring mast and beacon atop the Penobscot building, shown behind City Hall.

annual meeting

9:30 A.M.

Board of Directors Meeting

Ivory Room, Hotel Statler

Technical Sessions

Wayne Room, Hotel Statler

Dies for Forging High-Temperature Alloys by E. O. Dixon, Vice President of Research and Metallurgy, Ladish Co.

Normandie Room, Hotel Sheraton-Cadillac

Engineering Procedure in Product Designing by R. L. McWilliams, Staff Assistant, General Motors Corp.

Grand Ballroom, Hotel Statler

Controlling Machine Down Time by R. E. Cross, Executive Vice President, The Cross Co.

Italian Gardens, Hotel Sheraton-Cadillac

An Evaluation of Spinning vs. Drawing by J. H. Lengbridge, Project Engineer, Aluminum Goods, Ltd.

Ladies' Activities

ASTE wives visiting Detroit for the 21st Annual Meeting will find a well-balanced program planned especially for them. While Society members are busy with technical sessions, the ladies will be visiting Henry Ford's famed Greenfield Village or enjoying a top-flight play from the New York stage.

They'll sit in on the interesting television program "Cinderella Week End" and may have the opportunity to win an all-expense trip to New York City. A feature attraction will be the luncheon at the Detroit Boat Club. Entertainment for this event will be presented by Celia Merrill-Turner, a young veteran of the music and theatrical world.

Featured on Friday will be a luncheon when the ladies will be the guests of the Chrysler Corp. They will be shown the Plymouth assembly line and receive a souvenir of their visit.

Two receptions will be held for the ladies, and, of course, the banquet Friday evening is a 'must' for everyone.

Definite schedules and tickets will be available at the registration desk at the Hotel Statler.

Responsibility for organizing and scheduling these activities has been handled by Mrs. Andrew Carnegie. Aiding Mrs. Carnegie have been Mrs. Michael Pinto and Mrs. Frank Curtis.

1 P.M.

Technical Sessions

Wayne Room, Hotel Statler

Use of Wax-Base Products in Metal Forming and Machining by J. B. Carse, Industrial Products Sales Manager, S. C. Johnson & Son, Inc.

Italian Gardens, Hotel Sheraton-Cadillac

Structure As an Index to Machinability by Dr. Norman Zlatin, Metcut Research Associates.

Michigan Room, Hotel Statler

Precision Production Balancing by G. C. Lawrie, Chief Engineer, Tinius Olsen Testing Machine Co.

3 P.M.

Panel Discussion

Problems in Thread Production

Grand Ballroom, Hotel Statler

Moderator: R. S. Holmes, Standards Engineer, AC Spark Plug Div., General Motors Corp.
Panel Speakers: Otto Hoelzel, District Manager, The Eastern Machine Screw Corp.; F. J. Hudson, Thread Grinding Engineer, Ex-Cell-O Corp.; O. E. Koehler, Chief Engineer, Greenfield Tap & Die Corp.; S. W. Lovejoy, Tool Supervisor, Small Apparatus Div., General Electric Co.; A. B. Reed, President, Reed Rolled Thread Die Co.; A. H. Bailey, Consulting Engineer, Hanson-Whitney Co.

program . . .

8 P.M.

Technical Sessions
Grand Ballroom, Hotel Statler

Automatic Manufacturing by J. Y. Kaplan, Head, Servo Section, Arma Corp.

Italian Gardens, Hotel Sheraton-Cadillac

Hard Coat Surfacing—"Tooling Applications of Hard Facing" by Lawrence V. La Rou, Chief Engineer, Wall Colmonoy Corp. "Carbide Flame Plating" by W. L. Donnelly, Research Engineer, Speedway Laboratory, Linde Air Products Co.

Friday, March 20

8 A.M.

Registration for Plant Tours and Technical Sessions

Ballroom Floor
Hotel Statler

9 A.M.

Plant Tours—Buses leave Hotel Statler for Business Machine Research and Assembly, Burroughs Adding Machine Co.; Shell Moulding Machines, Mechanical Handling Systems, Inc.; Automotive Hardware Manufacturing, Ternstedt Div., General Motors Corp.; Assembly Operations, Plymouth Div., Chrysler Corp.; V-8 Engine Plant, DeSoto Div., Chrysler Corp.

Technical Sessions
Grand Ballroom, Hotel Statler

Tool Engineering Applications of Titanium Carbide Alloys by W. L. Kennicott, Kennametal Corp.

Italian Gardens, Hotel Sheraton-Cadillac

Developments in Electrolytic Grinding by L. H. Metzger, President, Super-Cut, Inc.

Monta O. Cox

Kenneth W. Riddle

Clinton J. Helton

Thomas C. Barber

James O. Horne

Shown above are the members of the National Program Committee. They are responsible for arranging the technical sessions and discussions to be presented at the annual meeting. Mr. Cox is Host Committee representative. Mr. Waindle is first vice president of ASTE, Mr. Conrad is executive secretary. Frank Wilson is technical director.

Roger W. Waindle

Harry E. Conrad

annual meeting

Bagley Room, Hotel Statler

Equipment and Tooling for Contour Forming by O. C. Turchan, Director of Research and Development, Turchan Follower Machine Co.

English Room, Hotel Sheraton-Cadillac

Correlation of Metallurgy with Engineering Design by Dr. R. C. Gibbons, Chief Metallurgist, Utica Div., Bendix Aircraft Corp.

9:30 A.M.

Board of Directors Meeting

Ivory Room, Hotel Statler

1 P.M.

Technical Sessions

Bagley Room, Hotel Statler

Advances in Precision Boring by Dr. R. S. Hahn, Consulting Engineer, Heald Machine Co.

Grand Ballroom, Hotel Statler

Maintenance Expense Control of Production Tool and Equipment by E. E. Griffiths, Consulting Manufacturing Engineer, Westinghouse Electric Corp.

English Room, Hotel Sheraton-Cadillac

Manufacturing Applications for Metal Stitching by A. G. Denne, Manager, Round Wire Stitching Dept., Acme Steel Co.

Session Chairmen for 21st Annual Meeting

Edwin G. Small
Vice President
Daulen Corp.

Arthur F. Parker, Sr.
Chief Tool and Process Engineer
Argus Cameras, Inc.

Peter F. Rossmann
Executive Vice President
Hupp Corp.

Michael Pinto
President
Douglas Tool Co.
Pioneer Eng. and Mfg. Co.

Dr. J. H. McBurney
Dean
School of Speach
Northwestern University

Howard N. Maynard
President
Snyder Tool and Eng. Co.

George F. Daschke
Manager
Forge Div.
Packard Motor Car Co.

Walter F. Wagner
President
Wagner Eng. Co.

Walter F. Grier
Chief Tool Engineer
Jet Engine Div.
Chrysler Corp.

Lawrence W. Howe
Vice President
Lincoln Park Industries, Inc.

Frank L. McKeen
Supervisor
Tool Specialist Unit
Ford Motor Co.

William C. Gilbert
Prof. of Engineering
University of Michigan

John Meyn
Master Mechanic
DeSoto Div.
Chrysler Corp.

Russell F. Holmes
Standards Engineer
AC Spark Plug Div.
General Motors Corp.

T. O. Harrington
Vice President
Vickers, Inc.

Raymond C. W. Peterson
President
Peterson Eng. Co.

J. R. Miller
Vice President
Beaver Tool and Eng. Co.

Ramsey M. Bell
Technical Manager
Hammond Machinery Builders, Inc.

David C. Heath
Assistant Superintendent
of Tool Engineering
Ford Motor Co. of Canada

Robert A. Atkins
Coordinator of Domestic Mfg.
Burroughs Adding Machine Co.

Charles R. De Vlieg
Vice President
De Vlieg Machine Co.

A. D. Essler
Chief Process Engineer
GM Truck and Coach Div.
General Motors Corp.

Henry P. Ibser
Assistant Chief Tool Engineer
Plymouth Motor Div.
Chrysler Corp.

Arthur M. Swigert, Jr.
Vice President
Universal Products Co., Inc.

program . . .

3 P.M.

Panel Discussion

Honing, Lapping and Superfinishing

Moderator: A. M. Swigert, Jr., Vice President, Universal Products, Inc.

Panel Speakers: R. E. Carroll, Manufacturing Superintendent, Micrometrical Mfg. Co.; H. I. Sole, Manager of Lapmaster Sales, Crane Packing Co.; Herman Myer, Head of Superfinish Engineering, Gisholt Machine Co.; D. T. Peden, Director of Research, Micromatic Hone Corp.; L. K. Pruett, Abrasive Technical Assistant, Design and Standards Dept., Ford Motor Co.

7 P.M.

21st Annual Banquet and Membership Meeting
(Informal)

Grand Ballroom, Hotel Sheraton-Cadillac

Right, prior to the building of the Pentagon in Washington, the General Motors Bldg. was the world's largest office building.

Below, Detroit's Art Museum contains a noted collection of period paintings, porcelains and other art pieces.

National officials of the Society are pictured with C. E. Wilson, seated, left, recipient of the latest ASTE honorary membership which was awarded January 5. Others are: L. B. Bellamy, also seated, national president; (standing, from left) Joseph Crane, chairman of the Mid-Hudson chapter; Sam Boyer, National Membership Committee, J. J. Demuth, past president of the Society; Thomas J. Donovan, Jr., a national director of ASTE; and Carl Kertesz, National Membership Committee. The presentation, made by President Bellamy, was a highlight of the ceremonies held in conjunction with the Greater New York ASTE meeting.

Additional Candidates Nominated For ASTE Board of Directors Election

The following men have been legally nominated by petition and their names should be considered as qualified candidates for national director along with those contained in the report of the Nominating Committee of December, 1952.

Karl L. Bues—Owner and manager, Bues Production Equipment Co., Oakland, Calif. Charter member and past chairman of Golden Gate chapter, he has been active in chapter affairs. National director, two terms; former instructor of tool engineering and production engineering, University of California; former member of Apprentice Training Committee, California State Board of Education. An industrial executive and tool engineer since 1923, he is a regular contributor of technical articles to trade publications.

Karl Bues

Andrew Clark

Andrew B. Clark—Technical consultant for 33 years with Haynes Stellite Co., division of Union Carbide and Carbon Corp., Cleveland, Ohio. Senior member since 1939, he has served actively on various chapter committees and is presently chapter chairman. On the national scene, he has served successively on the Public Relations Committee, and is at present chairman of the National Membership Committee (two terms). He is a former faculty member at the University of Akron and teaching specialist for War Manpower Commission and War Production Board. He is active in other technical societies as well as civic affairs.

Howard Gross

Howard W. Gross—Senior member of Philadelphia chapter since 1939, he has held various chapter offices including that of chairman, has represented his chapter as delegate and alternate in the House of Delegates (two terms); former instructor of machine shop practice, mechanical drawing, industrial electrical engineering. A retired dean of engineering, Spring Garden Institute, Philadelphia, he is at present a consultant in engineering and design. He is a registered professional engineer and active in civic affairs.

Bellamy Presents Honorary Membership

In recognition of his efforts in contributing to United States defense production, an honorary membership in ASTE was presented January 5 to Charles E. Wilson, former director of defense mobilization and former president of the General Electric Co. The presentation was made at a meeting of the Greater New York chapter by the national president of the Society, L. B. Bellamy. The ceremonies were witnessed by more than 175 members and guests who met for dinner at the New York Times Building.

Urging tool engineers to take a more active part in civic responsibilities, Mr. Bellamy said he was proud to be able to present the award to such an outstanding American citizen as Mr. Wilson. A tremendous ovation was given the former defense mobilizer who expressed his appreciation and happiness on being the recipient of the high honor.

After the presentation, Mr. Wilson gave an inspiring talk on the profession of tool engineering and its need in the economy and political direction of the government.

National officers present for the outstanding meeting were: J. J. Demuth, past president; Joseph P. Crosby, second vice president; Thomas J. Donovan, Jr., national director; W. B. McClellan, national director; Carl Kertesz and Sam Boyer of the National Membership Committee. Other guests included: Richard A. Smith, Hartford chapter and candidate for election to the board of directors; Joseph Crane, chairman of the Poughkeepsie chapter; and Charles Bazaz, chairman of the Paterson chapter.

Coffee speaker was Herbert L. Carpenter, director of the Commerce and Industry Association of New York and president of the Carpenter Container Corp., Lindenhurst, N.Y. Also chairman of the Industrial Dispersion Committee, Mr. Carpenter outlined the industrial capacities in the metropolitan area of New York.

As technical speaker for the program, C. F. Cowan, consulting gear engineer for the Eastman Kodak Co., discussed the preparation of gear blanks for fine pitch gearing. —*Robert Frechman*

Joins Johnson-de-Vou

Edward R. Millard, member of the Worcester chapter of ASTE, has joined the sales force of Johnson-de-Vou, Inc. of Worcester, Boston and Springfield. Mr. Millard, a coated abrasive engineer, was formerly associated with Minnesota Mining & Mfg. Co.

Society Charters 104th Chapter at Joliet, Illinois

Harry Moffat receives charter from First Vice President Roger Waindle.

The 104th chapter of the American Society of Tool Engineers received its charter at ceremonies held in Joliet, Ill. on January 20. Making the presentation to the Louis Joliet chapter was Roger F. Waindle, first vice president of the Society.

ASTE's national organization was also represented by Harry E. Conrad, executive secretary, and Dale Long, Chicago chapter member, who attended the event in behalf of Verne Loeppert of the National Membership Committee. Nearly 160 persons participated in the charter night activities held in the Terrace Room of the Woodruff Hotel.

Benefits of Membership

Mr. Waindle addressed the group with a brief talk on the benefits derived from membership in ASTE. He congratulated the Louis Joliet chapter and presented the charter to Harry Moffatt, chairman pro tem. Permanent officers were not elected until the February meeting.

To aid in the chapter's membership activities, a membership kit was presented by Mr. Long to Kenneth Hanks, head of the Louis Joliet membership committee.

The events leading to the chartering of ASTE's 104th chapter were reviewed by F. E. Bowers, first vice chairman pro tem. Organization discussions began in November of 1951. A number of meetings followed, with Mr. Bowers, Mr. Hanks, Mr. Moffatt, Ray Eken, Elmer Dixon, Don Stanfield, Harold Zierke playing prominent roles. A series of six letters were sent to key personnel in Joliet industries. Descriptive literature and application blanks were included in one of the later mailings.

Great Demand for Tickets

Requests for charter night tickets and additional application blanks began pouring in. The original estimate of 70 persons attending the event was adjusted several times, Mr. Bowers said, and reservations for the evening's ceremonies finally hit the 155 mark.

Election of officers for the chapter took place on February 17. Serving on the nominating committee were R. Gomien, J. Potter and L. Rohman.

The technical lecture was delivered by Bernard Better, director of research for Scully-Jones and Co., Chicago. He spoke on "Production Tool Developments." A brief question and answer period followed his discussion. Mr. Better was introduced to the chapter by M. Burdett, technical chairman for the evening. —*Harold Zierke*

Bellamy, Smillie Meet with College Students

Ann Arbor, Mich.—L. B. Bellamy, ASTE president, and Charles M. Smillie, chairman of the National Professional Engineering Committee, met January 7 with industrial representatives and nearly 50 University of Michigan students to discuss a proposed student chapter of the Society. Arrangements for the organization meeting were made by W. W. Gilbert, professor of production engineering, vice chairman of the National Education Committee and second vice chairman of the Waterloo Area chapter.

Prof. O. W. Boston was chairman for the session. Industry from the Ann Arbor area was represented by James A. McCollum, general superintendent of the American Broach and Machine Co. and past chairman of the Waterloo Area chapter; E. Schlenker, plant manager of Argus Cameras, Inc.; R. Tasch, chief engineer of the Buhr Machine Tool Co.; A. F. Parker, Sr., chief tool and process engineeer for Argus and education chairman for the Waterloo chapter. They spoke briefly to the students on "What Tool Engineering Means to Industry."

Mr. Bellamy and Mr. Smillie discussed the relationship of ASTE to industry, education and to the student.

Temporary officers for the student group were elected to investigate student interest in the proposed chapter. K. H. Moltrecht is faculty advisor and W. McGregor was named temporary student chairman.

Mr. Schlenker of Argus volunteered to pay the Society initiation fees for all students wishing to join ASTE. Dinner expenses for the meeting were paid by Mr. McCollum of American Broach and Machine Co. and Mr. Tasch of Buhr Machine Tool Co.

Officers Named to Plan Connecticut Night

At an executive meeting of the Fairfield County, Hartford and New Haven chapters of ASTE held January 12, officers were named to plan the Fifth Annual Connecticut night.

Phil Marsilius, Fairfield County second vice chairman, was appointed chairman for the event. Vice chairmen are Emmanuel Lull, first vice chairman of the New Haven chapter, and Omar Gingras, first vice chairman of the Hartford chapter. Others serving on the arrangements committee are E. R. Mayberry and E. W. Laistner, secretary-treasurer of the Fairfield chapter.

Joseph P. Crosby, second vice president of ASTE, and Ray H. Morris, past president of the Society and one of the originators of Connecticut Night, were present for the executive session.

An attendance of 300-500 members and guests is expected to attend the event, scheduled for May 6. Activities will include a plant visitation, technical paper and a special banquet.

National Committee Chairmen Hold Conference

Chairmen of ASTE national committees held their January meeting at the national headquarters of the Society in Detroit. Shown here, left to right, are: Leslie Hawes, public relations; Arthur Diamond, education; Allan Ray Putnam, assistant executive secretary; Harry Marx, representing the constitutions and by-laws committee; James Horne, program; Dale Burke, membership; Roger Waindle, first vice president of the Society; Charles Smillie, professional engineering; R. C. W. Peterson, standards; William Jarvis, finance; F. J. Sehn, book; Wayne Kay, editorial; and Harry E. Conrad, executive secretary. Staff personnel (shown at right hand table) were represented at the session by: Fay La Roue, Jeanne Barman, Harry Anderson, Cal Burke, Marvin Bunting, Richard Bacik, Frank Wilson and Stuart Hall of Denham & Co., public relations counsel for ASTE.

The photographs shown in the background are of the Society's past presidents. Another wall of this room, known as the ASTE conference room, is designated for honorary and life members of the American Society of Tool Engineers.

Warren Hardy Makes Worcester ASTE Talk

Worcester—A joint dinner meeting with the Society of Carbide Engineers was held January 6 at Hickory House by the Worcester ASTE chapter. E. Roland Ljungquist, ASTE chapter chairman, presided at the business portion of the meeting. Preferences for national directors of the Society were indicated and a nominating committee was chosen to select a slate of chapter officers for the coming year. Pins were presented to the new ASTE members present at the meeting.

Warren Hardy

The program speaker was Warren L. Hardy, carbide grinding engineer, Norton Co., who spoke on "Electrolytically Assisted Grinding of Carbides." Slides were used to illustrate portions of the lecture.

Mr. Hardy described in detail the devices and methods used in tests to evaluate electrolytic grinding of cemented carbide, particularly the sharpening of single-point carbide tools. Rates of cut and diamond usage in conventional grinding compared with the electrolytically assisted grinding indicated that the latter is promising as a commercial method of shaping single-point carbide tools and conserving diamond bort.

However, he emphasized that an unqualified recommendation could not be given the method until the completion of additional tests, more field experience is gained and other aspects have been investigated more thoroughly.

—Harold F. Thompson

Dawson Heads New Firm

W. A. Dawson, a past national secretary of ASTE, has established a new firm in Hamilton, Ont. Known as Dawson-Rhoades Machinery Co., Ltd., the company also has a branch office in Montreal. Mr. Dawson is serving as president and general manager. He was formerly a representative for the Gun Division of the Department of Defense.

Human Relations Theme of Long Island Program

Garden City, N. Y.—An unusual ASTE program was presented January 12 for the Long Island chapter when a talk on human relations was given by the manager and sponsor of the Dale Carnegie Institute of Human Relations on Long Island, John Mason. More than 150 members and guests heard his discussion titled "How to Deal with People to Get Things Done." The meeting was held at the Garden City Hotel.

John Mason

Mr. Mason, who is also promotion manager for the King Features Syndicate, emphasized three of the basic principles of modern psychology, the challenge, the recognition and the utilization of the other persons' desires and the universal craving of the human being for appreciation. *—S. Moxley*

ASTE Visitors to Tour New Purdue Laboratory

ASTE members attending the tool engineering conference at Purdue University, Lafayette, Ind., on April 18 will visit the university's new million-dollar machine tool laboratory, considered one of the finest in the country. The tour will include demonstrations on cutting tool dynamometers, die-clearances, and tooling for production.

The newest developments in the production of metal parts will be discussed at the technical sessions. Scheduled topics will cover "Processes for Machining Unmachinable Parts" and "Form Generating by Grinding."

The conference is cosponsored by the Indiana chapters of ASTE, Evansville, Fort Wayne, Indianapolis, Muncie, Richmond and South Bend. Halsey F. Owen, professor of manufacturing processes at Purdue and a member of the Indianapolis chapter, has been named chairman.

He met recently with ASTE representatives, Prof. O. D. Lascoe of the machine tool laboratory, Prof. M. M. McClure of the division of adult education, and Keith Glancy, conference supervisor, to arrange the program for the conference.

Purdue University's million-dollar machine tool laboratory.

Martindell Receives Honorary Degree

An honorary bachelor of science degree in tool engineering has been awarded Frank Martindell, charter member of the Chicago ASTE chapter, by the American Institute of Technology.

In conferring the degree, Harry Lebeson, president of the Chicago school, emphasized Mr. Martindell's outstanding contributions to the profession, his work in ASTE and the formation of the Chicago chapter, and his many contributions on technical subjects to the *Tool Engineers Handbook* and to business journals.

For the past 26 years Mr. Martindell has been associated with Western Electric Co. and its subsidiary, Teletype Corp. He plans retirement in February to devote his time to his own business as an engineering consultant. He will be associated with Clifford Ives, also a member of the Chicago ASTE chapter.

Appointed Sales Manager

Richard A. Modig has been appointed general sales manager of the Holo-Krome Screw Corp., Hartford, Conn. Mr. Modig is a member of the Springfield, Mass. ASTE chapter.

Mid-Hudson Chapter Sponsors Classes

Under the direction of Jack L. Petz, chairman of the education committee, the Mid-Hudson ASTE chapter is sponsoring a course in metallurgy at the Spackenkill School in Poughkeepsie, N.Y. A total of 84 students have enrolled for the eight-week course, which is free to chapter members. Certificates will be awarded to those completing the course.

John Dormeyer, member of Mid-Hudson education committee, and John L. Petz, education and committee chairman outline vocational program.

Instructor for the classes is John Dormeyer, instructor of vocational education at the school. He has been aided in setting up the course by Mr. Petz and Walter Stadtler.

The weekly lectures, supplemented with slides, movies and exhibits, cover the following subjects: making iron and steel, processing in the steel mill, classifications of steel, heat treating, selection of materials, nonferrous metals, and materials testing.

—S. P. Cook

Hawes, Chrissi Attend Eisenhower Inauguration

Among the thousands of persons who witnessed the inauguration of President Eisenhower were Leslie F. Hawes, chairman of the ASTE National Public Relations, and Mr. and Mrs. Ralph Chrissie (he is the Los Angeles chapter chairman). They attended the ceremoney, parade and Inaugural Ball on the invitation of Vice President Richard Nixon.

Included in their crowded two-day schedule was the California reception held at the Hotel Willard where they were greeted by Mr. Nixon, Governor Earl Warren, Senators Nolan and Kuchel and a number of California congressmen. Invitations were also extended to the California trio to attend the exclusive Marching and Chowder Club reception.

Mrs. Chrissie served on the committee on arrangements for the California reception.

While Mr. Hawes flew back to California, the Chrissies stopped off in Detroit to visit Harvey Groehn, past vice chairman of the Los Angeles chapter, and to pick up a new car in the Motor City. They returned to the West Coast by the leisurely route.

Williamsport Chapter Tours Foundry Company

More than 140 members and guests of the Williamsport ASTE chapter toured the Berwick plant of the American Car & Foundry Co. during the chapter's January 12 meeting. Dinner was served at the Eagles Club before the visitation got under way.

The group inspected the production and assembly facilities for the T-141 and T-98 armored weapon carriers being manufactured for the armed services.

—Leonard Kline

Television Station Airs ASTE Program

A miniature plant layout of Barth Stamping and Machine Works, shown on the Cleveland television show is studied by F. J. Sindelar, assistant chief engineer, and G. A. Hier, chief estimating engineer and past chairman of the Cleveland chapter.

A television program on ASTE and tool engineering was featured January 4 by station WNBK, Cleveland affiliate with the National Broadcasting Co. Sponsored by the Cleveland ASTE chapter, the program was one of a series put on by the Cleveland Technical Societies Council to acquaint viewers in the northern Ohio area with the various fields of engineering.

A. B. Clark, chairman of the National Membership Committee and chairman of the Cleveland chapter, was the main speaker. He covered the educational and vocational requirements for tool engineering and told of the local and national activities of the ASTE.

Other highlights of the 30-minute program included presentations showing shop layout and various operations in a machine shop made by Glenn A. Hier, chief estimating engineer, Barth Stamping and Machine Works; and Howard Noll, tool engineer, White Sewing Machine Co.

The series, entitled "Adventures in Engineering," is designed to publicize activities of the 46 member societies participating in the council.

Named to New Positions

Two members of the Montreal ASTE chapter recently received new appointments at Canadian General Electric Co. John Leblanc has been named supervisor of methods for kitchen equipment and Thomas Hill is now in charge of tool control at the Montreal Works, Major Appliances Div.

Pontiac Chapter Visits Seamless Tube Co.

Pontiac, Mich.—About 90 ASTE members and guests toured the Michigan Seamless Tube Co. at South Lyon, Mich., as part of the January technical program of the Pontiac chapter. In charge of the evening's activities was Mr. Baisch, vice president of the firm.

Visitors found the modern heat-treating furnaces and the hot mill at the plant of particular interest. The tour was concluded on a social note when coffee and doughnuts were served by the company. *—T. R. Gibson*

Richard Herold Gives Review of Cronin Process

New Haven, Conn.—A nominating committee to select candidates for the coming election of chapter officers was named at the January meeting of the New Haven chapter. Chosen to serve on the committee were F. W. Gilbert, Russell C. Applegate and Joseph Benson. The dinner session was held at the New Haven Country Club.

New members were introduced to the chapter by Stanley Porritt, chairman of the membership committee.

The technical program was presented by Richard Herold of the Borden Co. in New York. He discussed the Cronin Process and its advantages, limitations and its place in manufacturing processes and methods. Samples of castings were shown to illustrate the clean sharp surfaces possible with this method. The speaker was introduced by John S. Brozek, program chairman of the chapter. *—Silas W. Becroft*

Fox River Valley Visited by Waindle

Roger F. Waindle, first vice president of the Society, addressed the Fox River Valley chapter at a dinner meeting in the Baker Hotel at St. Charles, Ill., on January 6. He discussed the national operations of ASTE, highlighting the annual meeting and leadership conference scheduled for March 16-20.

Technical speaker for the evening was Oakley Sloter, supervisor of welding training, Caterpillar Tractor Co., Joliet plant. His talk, illustrated with slides, covered "Redesign for Welding."

The Fox River Valley Christmas party was held December 2 at the Hotel Baker in St. Charles. A crowd of more than 200 persons attended the annual event. With steak on the menu for dinner, a floor show for entertainment, dancing to the music of a fine orchestra and the presentation of a number of prizes, the evening was a thoroughly enjoyable one.

Ed Dickett of the Rockford chapter presented an unusual interpretation of the characterization of a toastmaster and acted as master of ceremonies throughout the program.

—Donald E. Zierk

Santa Clara Holds First Ladies' Night

The first ladies' night of the Santa Clara Valley chapter was held on December 12. Despite cold (38 degrees) weather, nearly 150 members and guests were present at the La Rinconada Country Club for the program.

Dinner, dancing and entertainment highlighted the festivities. Tom Lang acted as master of ceremonies.

Among the guests attending the event were Mr. and Mrs. William Ware who came from Los Angeles especially for the party. He is one of the original organizers of the Santa Clara chapter.

—William C. Lanyon

Diebold Addresses Columbus ASTE Chapter

Columbus—Technical speaker at the January 14 meeting of the Columbus ASTE chapter was John M. Diebold of the Precision Welder and Machine Co., Cincinnati. He gave a 40-minute talk on "Tooling for Resistance Welding" and conducted a question and answer period after his discussion.

The chapter's Christmas party was attended by close to 140 members and guests. Music was provided through the dinner hour and entertainment featured a program by Bud Sweeney, staff announcer for station WHKC.

—Roscoe Zwoll

IBM Projects Engineer Presents ASTE Program

Poughkeepsie, N.Y.—More than 100 members and guests of the Mid-Hudson chapter heard N. Kenneth Perkins, project engineer at the Poughkeepsie plant of International Business Machines Corp., speak at the January 13 meeting held at the Nelson House. His subject was "Tooling and Manufacturing of Small Precision Parts."

Augmenting his talk with slides, Mr. Perkins illustrated numerous small parts and described in detail the methods of manufacture and the precision tolerances maintained. Punch press parts, he said, can be held to within tolerances of plus or minus 0.0002.

Blanking operations are generally run at 75 to 300 strokes per minute. Coining and shaving operations were also described as well as the method of grinding contours in the dies.

Walter Neidhardt, director of adult education at the Arling High School, gave a coffee talk on the topic of adult education. He urged greater cooperation between local industries and the school systems in setting up various night classes on industrial subjects.

—S. P. Cook

Twin States Session Features Talk by Pote

Springfield, Vt.—Close to 100 Twin States ASTE members met January 14 at the Trade Winds Cafe for dinner and a technical session.

Guest speaker was Lloyd W. Pote, chief engineer of the C.P.O. Eng. Co., Boston. His talk consisted of three major divisions. The first dealt with the general theory of shielded arc welding: making welds, types of joints, physical properties obtained, causes and cures of internal stresses.

Secondly, Mr. Pote covered design considerations in which service conditions, construction cost, sales appeal and the advantages of weldments over castings. Finally, he described the various operations performed during the manufacture of a typical weldment.

—Stacey C. Farrell

R. C. Annis
Indianapolis Star
photo by T. Wadelton

J. J. Mudd Presents Saginaw Valley Program

Frankenmuth, Mich.—A discussion on "Air Power and Its Uses as Applied to Machine Tools" was heard by 100 members and guests of the Saginaw Valley chapter who attended the January 15 technical session.

Guest speaker was J. J. Mudd, Detroit regional manager, The Bellows Co., Akron, O. A film entitled "Production Miracles" illustrated many applications of air power.

At a short business meeting, the chapter's nominating committee was elected and preferences were indicated for the ASTE Board of Directors.

—Ben Phillips

Newspaper Features Article on Robert Annis

"A Man of Precision" titled a full-page article on ASTE member, Robert Annis, which ran January 18 in the Sunday magazine section of *The Indianapolis Star*. The feature describes the rare talents of Mr. Annis who possesses an international reputation for creating intricate electronic balancing machines.

During the last war he was greatly in demand for the design and construction of special instrument equipment used in the production of delicate precision parts of airplanes, torpedoes and fire-control devices. Since then he has become known as the man who can take the bugs out of tough balancing jobs or magnetic problems.

Holder of many patents, Mr. Annis has created electronic balancing machines, instrument transformers and electric etchers which write on hardened steel with an incandescent stylus. He produced a line of spot welders with a motor-drive attachment so that women war workers could operate them without fatigue. He makes a variety of split-core current transformers used in testing heavy electrical power circuits without opening the circuit.

"It's a constant inventing job," he says. "Everything I have done is just making a hobby pay!"

Tigges, Bryant Address Executives' Meeting

Springfield, O.—The third annual Executives' Night of the Springfield ASTE chapter was held January 13 at the Springfield Country Club. The reception, dinner and top-flight program were attended by 112 members and guests.

The coffee speech was made by H. L. Tigges, past president of ASTE, vice president of the National Machine Tool Builders Association and executive vice president of Baker Brothers Co., Toledo. He reviewed the growth of ASTE and emphasized the Society's relationship to industry.

A. G. Bryant, president of the Bryant Machinery and Engineering Co. of Chicago delivered the major address of the evening. He spoke on industry's role in defense production. Other guests at the meeting were executives from a number of Springfield companies.

Arrangements for the special meeting were handled by Joseph Charters, Elwod Carmichael and William Smith. William T. Hicks was toastmaster and Kenneth A. Forsell, chapter chairman, presided.

—Kenneth A. Forsell

Springfield, Ohio, industry was well represented at the Executives' Night meeting of the ASTE chapter held on January 14. Paul Montanus, president of Springfield Machine Tool Co.; Kenneth Forsell, chapter chairman; Christian Baldenhofer, president of the Thompson Grinder Co.; Richard Montanus, chapter vice chairman; A. G. Bryant of Chicago, president of Bryant Machinery and Engr. Co.; and H. L. Tigges, ASTE past president, NMTBA vice president, and executive vice president of Baker Brothers, Inc.

Elmira Members Hold Joint Meeting with ASM

Elmira Heights, N.Y.—A joint meeting of the Southern Tier chapter of ASM and the Elmira chapter of ASTE was held January 12 at Pierce's Restaurant. Nearly 90 members and guests of both chapters attended the annual event.

Program speaker was Harry Jason, tool sales manager of the Carboloy Co., Detroit, who gave a talk on "The Characteristics of Cemented Carbides." Slides were shown detailing the highlights of his discussion.

Preceding the dinner, the ASTE group held a brief business meeting. An outline of the student drawing contest, sponsored by the chapter every year, was made by Donald Mosher, chairman of the education committee. A report on the status of the membership campaign was delivered by Membership Chairman Art Green.

—Raymond Banfield

Montreal Speaker Reviews Mechanical Power Presses

Montreal—James C. Danly, assistant chief engineer, Danly Machine Specialties, Inc., gave the main technical talk at the January meeting of the Montreal chapter. He spoke on "Uses of Mechanical Power Presses in Production," emphasizing the safety features which should be incorporated in power presses. Two films were shown to illustrate his lecture.

The initial speech of a series on "Friction in the Processing of Metal" was also presented during this program. The address was given by Antoni Niedzwiedski. *—Frank Winkworth*

H. E. Collins

Collins Discusses Leadership Conference

Houston—H. E. Collins, national secretary of the Society, was the coffee speaker at the January 13 meeting of the Houston chapter held at the Ben Milam Hotel. He discussed the leadership conference, national activities of ASTE, and gave some observations of conditions in Europe.

Technical speaker at the meeting was Robert F. Myers, general sales manager, Lees-Bradner Co., Cleveland. He talked on the topic "A Revelation in Threading."

At the business session the nominating committee was named to select candidates for the next election of officers. Appointed were Scotty Gilchrist, Homer Briggs and Ernest Reese. Mr. Reese is chairman of the industrial relations committee and the other two members are past chairmen of the chapter.

More than 115 members and guests attended the meeting.

—C. K. Hay

Canadian Chapters Visited by Rogers

January visits were made to the Hamilton and Niagara District ASTE chapters by G. A. Rogers, assistant secretary-treasurer and a national director of the Society. He spoke on several topics of ASTE interest, including the leadership conference, membership programs, the annual meeting and the general progress of the Society during the past year.

The Hamilton technical lecture concerned "Modern Gaging Equipment for Continuous Measurement." A. J. Burgoyne, sales engineer, Pratt & Whitney, Hartford, Conn., was the speaker. Illustrating his talk with slides, he outlined the early development of continuous gaging and told of the many successful applications in the steel, rubber, paper, glass and plastics industries.

A nominating committee was elected to select the slate of officers for the next election. Named were George Churchill, Clarence Bulmer and Gordon Hall, chairman.

The meeting, held January 9 at the Brantford Hotel, was attended by 65 members and guests. A social hour sponsored by Acme-Bertram preceded the dinner hour.

—John Litwin

Contest Launched to Name Chapter Bulletin

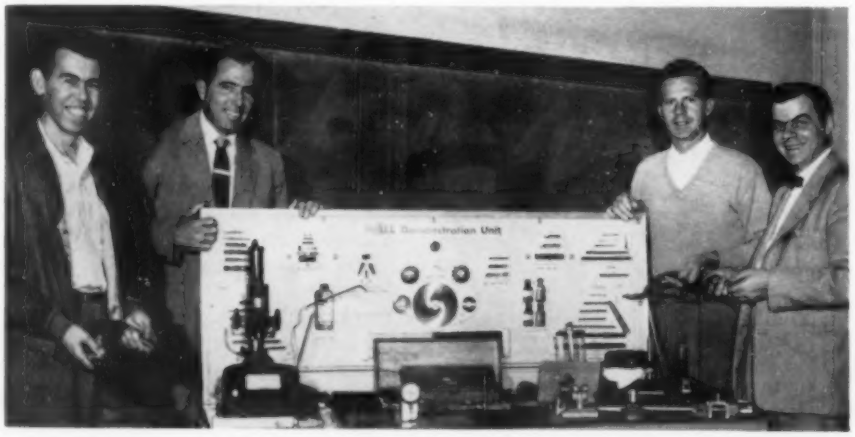
Winston-Salem, N. C.—A contest to select a new name for the Piedmont chapter bulletin was announced at the December 8 meeting held at the Hotel Robert E. Lee. The winner will receive Society dues for one year or a *Tool Engineers Handbook*.

In preparation for the annual election of officers, three Piedmont members were named to serve on the nominating committee. They were Robert Schneider, chairman, Henry Newsome and Ed Zagora.

The technical program was presented by Stanley A. Brandenburg, vice-president in charge of sales, Monarch Machine Tool Co., Sidney, O., who discussed "Modern Methods of Single Point Turning Using Tracer Controls." He covered types of controls, limitations and advantages of single point vs. multiple tooling, and the economies of various competitive methods.

Mr. Brandenburg pointed out that with tracer controls setup time is reduced up to 90 percent compared to multiple tooling. Other features include less distortion of centers, uniform tool pressure and the reduction of the amount of grinding stock required.

—Henry H. Palmer



The Tool Engineers' Club at Utah State College, an affiliate of the Salt Lake City ASTE chapter, presented Ray Francisco of the DoAll Co. (far right) in a lecture and the demonstration of precision measurement at a recent meeting of the Associated Student Engineers. The program included a film and an open discussion period. Officers of the club, Jay Beazer and Albert Watson, made arrangements for the technical lecture. This photograph and information on these student activities at Utah State were submitted by Prof. Frederick Preator who is a member of the Society's National Education Committee.

Past chairman and speakers who were present at the Rockford chapter's meeting honoring them are, from the left: standing, Fred Swanson, Sundstrand Machine Tool Co., Bruce Lundgren, Sundstrand Machine Tool Co., F. J. Kampmeier, Ingersoll Milling Machine Co., Leo Reiland, Barber-Colman Co., Kenneth Lund, Barnes Drill Co., Donald Hawkinson, Greenlee Bros. Co., Henry Ruehl, Fairbanks Morse Co., Ernest Norman, Woodward Governor Co., George Torrence, Ingersoll Milling Machine Co., George Johnson, W. F. & John Barnes Co., Edward Dickett, Sundstrand Machine Tool Co., Ernest Seeborg, Barnes Drill Co., Karl Kaiser, Ingersoll Milling Machine Co. Seated, George Saunders, Barnes Drill Co., Gunnard Olson, Ingersoll Milling Machine Co., George Rigeman, George D. Roper Corp., Howard Nelson, Barber-Colman Co.

Rockford Chapter Holds Past Chairmen's Night

Rockford, Ill.—Past chairmen of the Rockford ASTE chapter were honored January 8 when the group held its annual Past Chairmen's Night. Dinner preceded the meeting at Woodward Governor auditorium. More than 120 members and guests were present.

The program was highlighted by a forum on the European machine tool industry, reports on the recent Olympia Fair in London and the European Machine Tool Exhibition at Hanover.

Panel members were F. J. Kampmeier and Gunnard Olson, vice presidents, Ingersoll Milling Machine Co.; Fred Swanson, chief engineer, Sundstrand Machine Tool Co.; and George Saunders, assistant chief engineer, Barnes Drill Co. Mr. Kampmeier opened the meeting with colored slides showing the fairs, machine tool plants, machines, and scenes of current life in Germany. —*Kenneth Hull*

ASTE Chapter Welcomes Member from India

Newark—The first member from outside the United States to join the Northern New Jersey chapter was welcomed at the December 9 meeting. He is A. P. Dutt Choudhury from Calcutta, India.

Mr. Choudhury studied engineering in his native land and is presently a fellowship student in mechanical engineering at Princeton University.

The guest speaker was H. L. Murch of Jones and Lamson Machine Co., who presented a talk on "Modern Methods of Inspection by Optical Projection." A discussion period highlighted the technical session. —*Anthony F. Cuoco*

Mohawk Members Hear H. L. Murch Lecture

Utica, N. Y.—The development of optical comparators as measuring tools was covered by H. L. Murch, chief optical engineer, Jones & Lamson Machine Co., Springfield, Vt., when he spoke to the Mohawk Valley chapter at the December meeting. About 50 members and guests were present for the dinner and technical session held at Hart's Hill Inn.

Mr. Murch spoke on the subject of optical projection and presented a sound film in color titled "What's the Difference" which illustrated the many possible applications of these useful tools. —*R. B. Hurley*

Cincinnati Speaker Reviews Band Machining

Cincinnati—The January program of the Cincinnati chapter included a dinner, showing of a colored film, technical speech, and a brief business meeting. The meeting was held at the Engineering Society of Cincinnati.

Fred O. Hutchinson, director of training for the DoAll Co., Des Plaines, Ill., presented the technical session. He spoke to the 80 members present on "Band Machining in Modern Industry."

In describing the types of band machines, he pointed out that with the provisions for attachment of fixtures and hydraulic feeding mechanisms, the band machine has earned a position with other machine tools. He covered four types of machining, band sawing, friction sawing, band grinding and diamond band cutting.

Tool engineers were reminded that the band saw should not be considered only for tool and die work, but can be profitably used in production machining of plastics, paper, wood and metals. —*Louis H. Schumann*

James Meehan Addresses Salt Lake City Chapter

Salt Lake City—A technical program on "Product Analysis and Equipment Selection" was heard by members of the Salt Lake City chapter at the January 16 meeting. Speaker for the evening was James Meehan of Brown and Sharpe Mfg. Co., Providence, R.I. The session was held January 16 at the Tower Coffee Shop.

—*G. M. Shaw*

Ex-Cel Tool, Die & Engr. Co. employees made a recent trip to St. Louis to tour the McDonnell Aircraft Plant. The tool firm, located in Kansas City, Mo., is headed by Jack T. Needham, first vice chairman of the ASTE chapter there. Shown here, back row, from left: Tom Waddell, Richard Hoffman, Leslie Hall, Tom Wilson, O. W. Robertson, Al. Spillane, Cleve Claxton, Vernon Dorse, Glenn Hubbard, Ernest Rothen. Front row: A. R. Peterson, Jack Nolan, J. A. Nakamura, Michael Nash and Jack T. Needham. Most of the men are active ASTE members of the Kansas City chapter.

Potomac Members Hear Lt. Comdr. Kauffman

Washington, D. C.—An outstanding technical program was presented to the Potomac chapter on January 8 when members heard a lecture on "Statistical Quality Control." Featured speaker was Lt. Comdr. W. W. Kauffman, inspection department, U. S. Naval Gun Factory.

He defined the subject as the use of facts relating to the degree of conformance to regulate operation. With the assistance of a magnetic board, colored segmented diagrams and several sets of dice, he demonstrated the principal characteristics of three types of inspection. He emphasized, "The frequency distribution system, properly used, can help in determining cause of defects and is less expensive and more efficient than sampling inspection."

The dinner and technical session were held at the Hamilton Hotel. Nearly 70 ASTE members and their guests attended. A nominating committee was chosen to select the slate of officers for the next election. Appointed were Robert E. Bear, Jr., chairman, Hugh M. McLeod and Robert T. Plitt.

—E. C. Austin

James Meehan Addresses Los Alamos Members

Los Alamos, N.M.—"Grinding Cylindrical Parts Requiring Extreme Accuracy" was the topic covered by the technical speaker at the January 14 meeting of the Los Alamos ASTE chapter. Addressing the group was James Meehan of the Brown & Sharpe Mfg. Co. of Providence, R.I.

He dealt primarily with basic procedure and sometimes forgotten details of setup and preparation for accurate cylindrical grinding.

The meeting, attended by 35 members and guests, was held in the Little Theater of Los Alamos High School.

—Herman J. Von Steeg

One of the most outstanding plant tours taken by members of the Twin Cities ASTE chapter was made when they visited Continental Machines, Inc. Shown at the dinner which preceded the visitation, seated, are: C. Eric Fasth, first vice chairman; Jerome W. Schwartz, second vice chairman; Donald A. Reiner, chairman; Robert M. Johnson, secretary; and Philmore W. Armstrong, treasurer. Standing are John Harrington, past chairman, and Ernest L. Drew, vice president in charge of engineering, Continental Machines, Inc. More than 150 members participated in the activities.

Twin Cities Members Tour Continental Machines

Savage, Minn.—A thoroughly enjoyable and instructive plant tour of Continental Machines, Inc. was made in November by more than 150 members of the Twin Cities ASTE chapter. The firm manufactures the DoAll contour sawing and filing machines, precision surface grinders, gage blocks, and precision gage instruments.

A social hour preceded dinner which was served in the company cafeteria. The business meeting was abandoned to enable the membership to spend the maximum time in the plant.

Beginning in the engineering department, the guided tour took members through the production department where they saw extensive steel plate flame cutting and welding, a type of fabrication used extensively in the contour saws made by the company. They saw some of the punch-press operations and many fine setups in the machine shop, viewing these processes on both contour saws and surface grinders on the assembly line.

—Murrell F. Kautz

Chapter Presents Program on Precision Grinding

Hartford—Herb Richardson of Brown & Sharpe Mfg. Co. was chairman of the technical activities meeting of the Hartford ASTE chapter held January 19 at the Hartford Gas Co. auditorium. Subject for the session was "Precision Grinding."

Participants in the panel discussion were: Richard Moore, president of Moore Special Tool Co., who spoke on contour grinding; Carl Soderland, sales engineer for the Norton Co., who spoke on abrasive grinding wheels; and J. B. Wilkie, sales engineer with Niles-Bement-Pond Co., who spoke on gaging.

—John Hand Conrad

Los Angeles Speaker Discusses Rockets

Los Angeles—Meeting at Scully's Cafe, about 160 members of the Los Angeles chapter heard a technical presentation by W. J. Merboth, staff assistant, Aero Jet Engineering Corp., Azusa, Calif. His topic concerned rockets and their application.

Two films were used to illustrate the lecture. One showed the phenomenal lift given to airplanes and the other pictured the launching of a V-2 type rocket from the deck of a sea carrier.

—S. J. Parsons, Jr.

A full scale photograph of a cutaway view of a "JATO" was shown at the ASTE program of the Los Angeles chapter presented by W. J. Merboth, second from left, staff assistant, Aero Jet Engineering Corp., Azusa, Calif. Pictured with the guest speaker are, from left: Dan Campbell, chairman of the program committee; Mr. Merboth; Ralph Chrissie, chairman of the chapter; and Carl Almquist, first vice chairman.

Santa Clara Sponsors Tool Engineering Classes

Early enrollment in the tool engineering course sponsored by the Santa Clara Valley ASTE chapter indicates that close to 50 students will be taking the classes at San Jose State College. Conducted by Carl F. Kaiser, assistant professor of engineering and chairman of the chapter's education committee, the course is divided into two sections, each ten weeks long.

Upon completion of each series of classes, students will receive an appropriate certificate from the ASTE chapter and three credits in the undergraduate school of the college of engineering.

Subject matter being covered includes: economics of tool engineering, nature of costs, administrative aspects, metallurgical aspects, determination of the production process, cutting tools, jigs and fixtures, die design, gages, and tooling and efficient use of automatic screw machines.

Instructors are: V. G. Aleshin, R. Shriver, B. Berlein, Norman Morse, Carl Horack, Roy Denham, Frank Menard, and Prof. Kaiser.

—William C. Lanyon

ASTE Chapter Presents Two Scholarship Awards

Rochester—The annual scholarship awards of the Rochester chapter were made at the January 5 meeting held

Sherman Hagberg, center, presents awards to students Stoney and Winkle.

at Barnard's Exempt Firemen's Association. Recipients were two students at the Rochester Institute of Technology, Dan Stoney and Herbert Winkle.

Speaker for the evening was Frederick Mylchreest, eastern district sales manager, Whitman & Barnes Co. Participants in a panel discussion included: Jerry Curtin, Navy Ordnance, Eastman Kodak Co.; W. Stechni, Rochester Products Div., General Motors Corp.; and Ed Smith, General Screw Products.

—Paul Bruno

Members of the planning committee who made arrangements for the Ladies' Night party put on by the Santa Clara Valley ASTE chapter gathered for a photograph the night of the annual event. Shown here, from left: the master of ceremonies, William Forbes, Vincent Diehle, Bud Hilton, Jack Esler and Bill Wright. The party, held in December, was attended by a large number of couples.

Plant Tour Attracts 500 Members and Guests

Scarboro, Ont.—More than 500 members and guests of the Toronto chapter visited the Canadian S.K.F. Bearing Co., Ltd., for a plant tour on January 7. The group was welcomed by Frank Ormerod, production superintendent for the firm.

During the tour members and guests were able to observe the machining of inner and outer races for ball and roller bearings as well as the heat-treating and finish-grinding operations. The bearing balls are not manufactured at this plant but are shipped there for assembly.

—W. H. Weatherhead

Toledo Chapter Holds Past Chairmen's Night

Toledo—Eight past chairmen of the Toledo ASTE chapter were honored at the December 10 meeting held at the Maumee River Yacht Club. They were presented to the 70 members present by the chapter chairman, Elmer L. Faber.

The technical program featured a talk by Joseph I. Karash of the Reliance Electric & Eng. Co., Cleveland. He gave a down-to-earth approach to the problems involved in proper design of tooling, placing special emphasis on the design of jigs and fixtures.

With the receipt of 33 applications from prospective members, the chapter's "440" membership campaign is quickly approaching the goal. Dinner tickets were given to the three men sponsoring the most new members: William Claus, Chairman Faber and Past Chairman Sam Burgess. The drive has also resulted in obtaining the chapter's first two affiliate members, Ohio Belting and Transmission Co. of Toledo and Electric Auto-Lite Co. It was also noted that all of the employees at Peterson Engineering Co. of Toledo are members of ASTE. *—C. C. Hartwig*

Meehan Speaks on Precision Grinding

Hartford—I. F. Holland, past president of the Society, was a special guest at the January meeting of the Hartford ASTE chapter. About 80 members and guests attended the dinner at the City Club and went on to the Hartford Gas Co. auditorium for the technical session.

Program speaker was James Meehan, director, Grinding Machine Div., Brown & Sharpe Mfg. Co., Providence, R.I. He presented the basic aspects of precision grinding and the problem of machine alignment which must be met for precision grinding on a production basis.

Mr. Meehan amplified these fundamentals with an explanation of the built-in features of the Brown & Sharpe "Electroline" grinder.

—John Hand Conard

Wesson Representative Discusses Carbide Tools

New Orleans—An all-time record for attendance at New Orleans ASTE meetings was established January 14 when 105 members and guests met at Tulane University for dinner and a technical session on carbide tools.

Guest speaker was P. S. Shover, The Wesson Co., Detroit, who discussed the design and practical application of carbide tools. His talk was followed with a film covering the entire process of manufacturing tungsten carbide metal.

Chairman James R. Cypher presided at the short business session. He introduced the new members and the several invited guests to the chapter. The announcement that the preseason goal of 100 members had been achieved was met with prolonged applause. A list of candidates for the various chapter offices was presented by the chairman of the nominating committee. *—John Sale*

ASTE student activities at the Allied Institute of Technology held their first Christmas party at Pulaski Village in Chicago. The Student chapter is a branch of the Chicago ASTE chapter and has about 160 active members. Among the 300 who attended the party were, from left: Anthony Salopek, treasurer; Ted Brolund, president; Gibson Vonsemittou, retiring president; H. H. Katz, vice president of Allied Institute of Technology; and H. Lebeson, president of the school.

Atlanta Session Draws 80 ASTE Members, Guests

Atlanta—A large attendance of ASTE members and guests of the Atlanta chapter attended the outstanding technical session presented at the January 19 meeting. Nearly 90 persons were present to hear a talk on the development of the famed B-47 bomber. Program speaker was Walter Krug, chief tool engineer, Georgia Div., Lockheed Aircraft Corp., Marietta, Ga.

He revealed as many of the problems relating to the tools for production of the aircraft as security precaution would permit. Information of a classified nature could not be divulged, but he was able to cite many of the tooling difficulties encountered in meeting the fantastic dimensional tolerances.

In spite of a greatly restricted question and answer period, the discussion period which followed Mr. Krug's speech presented much stimulating information.

—J. L. Morris

Ladies' Night Program Held by Chicago Members

Chicago—The annual ladies' night program and winter carnival were held by the Chicago ASTE chapter on January 17. More than 200 persons attended the event held at the Keyman's Club. Supper and dancing highlighted the program which also featured a number of games and the awarding of many prizes to all those present.

On January 5 the chapter heard a talk by Dr. Max Kronenberg of Cincinnati Milling Machine Co. He spoke on distortion, deflection and vibration in machine tools. About 100 members were present for Dr. Kronenberg's excellent presentation.

—A. L. Winkler

Reinerton Discusses Punch and Die Problems

Fort Wayne, Ind.—An exceptionally large attendance was on hand for the January technical session of the Fort Wayne ASTE chapter. About 90 members and guests met at the Chamber of Commerce to hear a talk by J. R. Reinerton, manager of the midwestern division of Pivot Punch & Die Corp. He spoke on "Pivot Punches, Their Use and Application."

Using slides to illustrate highlights of his subject, Mr. Reinerton told how the Pivot punches are able to punch holes of a diameter less than the thickness of the material in which they are punched. An exhibition of products was displayed at the Chamber of Commerce the afternoon of the meeting.

Coffee speaker on the program was Asron T. Lindley, superintendent of Fort Wayne Public Schools, who gave an interesting talk entitled "Our Heritage."

—Eugene T. O'Keefe

The January technical program for the Fort Wayne ASTE chapter was presented by J. R. Reinertson, center, manager of the midwestern divisions, Pivot Punch & Die Corp. He spoke on "Pivot Punches, Their Use and Application." Shown with the speaker are Chairman Everett Keese and First Vice Chairman Donald D. Welbaum.

Golden Gate Chapter Hears Stanley Cope

San Francisco—Stanley R. Cope, president, Acme School of Die Design Engineering, South Bend, Ind., spoke to more than 85 members and guests of the Golden Gate chapter at the January meeting. He presented an illustrated lecture on "Processing and Designing Dies for Deep Drawn Stampings."

Mr. Cope discussed the graphical method for finding blank diameters, percentage and constant systems for computing reductions, and drawing angles. He covered in detail the design of single and double action dies for drawing shallow, deep, wide flanged, square and rectangular, conical and tapered, spherical and oval, and special shaped shells.

The appreciation of the chapter was extended to Dean Roulund for the new program announcement he prepared. Other business handled at the meeting included the selection of a nominating committee for the annual election of officers.

—T. N. Lindquist

Riedel Addresses ASTE-ASM Meeting

York, Pa.—At a joint meeting with the York chapter of ASM, members of the Central Pennsylvania ASTE chapter heard a talk on "The Tool Steel Trouble Shooter." Technical speaker was J. Y. Riedel, tool engineer with Bethlehem Steel Co.

He discussed in detail the five fundamental factors which cause tool failure. He cited faulty heat treatment as the greatest cause and also listed poor tool design, incorrect steel used, improper tool grinding, and mechanical and operational conditions.

—Roy Livingston

Leo K. Lyon, left, student in die design at the University of Kansas, receives his ASTE certificate from John W. Hoover, center, chairman of the Kansas City chapter. N. Webster Rickhoff, manager of the university extension which offered the course, is at the right.

Lehigh Valley Program Presented by Fletcher

Stewart G. Fletcher, chief research metallurgist, Latrobe Steel Co., was the featured speaker at the January 16 meeting of the Lehigh Valley chapter. The technical session and dinner were attended by about 60 members and guests.

Mr. Fletcher discussed the recent developments in tool and die steels. He classified them along three principal lines—new alloying, more accurate heat treatment, and improved steel quality through supersonic inspection and prevention of carbon segregation.

—John D. Folwell

Long Beach Chapter Meets Membership Goal

Long Beach—With a total membership of 251, the drive for new Long Beach ASTE members ended January 14 on a highly successful note.

A nominating committee was selected at the business session. Selecting the slate of officers for the March election are Mr. Edson, Vern Powell and Joe Smith.

The technical program was handled by Ralph Hamilton of the Farand Optical Co., Inc., who showed a group of slides on the development and use of optical tooling. He answered questions at the end of the program to clear up many points on how optics are applied to jig and fixture building.

—W. C. Irby

Winners in the Long Beach membership campaign were announced at the chapter's January 14 meeting. Third place winners were Kenny Nelson and Ray Garris, left to right, who were awarded pen and pencil sets. The first prize of a watch was presented to Al Watts, second from right, who sponsored 15 new members. Carrol Edson, far right, won a brief case as the second place gift.

Indianapolis Program Features J. H. Mansfield

Indianapolis—J. H. Mansfield, chief engineer, Greenlee Brothers and Co., Rockford, Ill., was the program speaker at the January 8 meeting of the Indianapolis ASTE chapter. Nearly 90 members and guests attended the session which featured a film presentation and a lecture on three different automatic transfer machines.

At the business meeting announcement was made of the appointment of H. D. Hiatt, John Horton and R. F. Krause to the nominating committee. Attention was called to the tool engineers' conference to be held in April at Purdue University and the refresher course in preparation for state registered professional engineering examination to be given at the Indianapolis extension of the university.

—Richard A. Garber

DoAll Engineer Describes Microstep Gaging System

Kansas City, Mo.—"The Microstep Gaging System" was the program topic at the January 7 meeting of the Kansas City ASTE chapter. About 100 members and guests met for dinner and the technical session at Roselli's Restaurant.

Guest speaker was John Harrington, chief engineer, DoAll Co., who was one of the originators of the DoAll gage block system. He stressed the errors introduced in ordinary gaging methods and gave some of the ways to lessen these errors.

As a special event, certificates were awarded to those who had met the requirements of the University of Kansas extension courses covering design of tools, jigs, fixtures and dies.

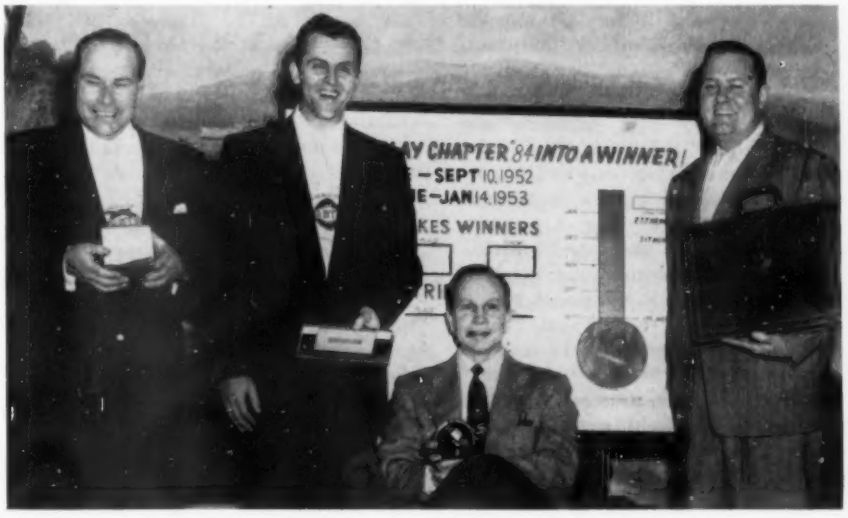
These courses are offered periodically by the University of Kansas extension, under the management of N. Webster Rickhoff and cosponsored by the Kansas City ASTE chapter. John R. Macke, tool design dept., Wilcox Electric Corp., and Ivan F. Cloud, Jr., wire plant manager and chief engineer, Whitaker Cable Corp., were the instructors.

—George C. Hopkins

Peterborough Committee Names Officer Selections

Peterborough, Ont.—Selections of the Peterborough nominating committee were announced at a recent meeting of the ASTE chapter. They are: Len Hansler, chairman; Don McGillen, first vice chairman; Bruce Mackenzie, second vice chairman; Earle Wellman, third vice chairman; Ralph Sanderson, secretary; and Borden Sherry, treasurer.

Members serving on the nominating committee were William Warren, John Olaveson and James Wilson.



Stone Discusses Precision Grinding

Boston—A group of 175 Boston ASTE members met January 8 at New England Mutual Hall to hear a technical talk on "Precision Grinding on a Production Basis." Program speaker was Stanley C. Stone, tool engineer, American Bosch Corp., Springfield, Mass. Dinner preceded the technical session.

Augmenting his speech with drawings, Mr. Stone covered the grinding of small inside and outside diameters to gage tolerances on a production basis.

As a special feature, part one of the film "The Making and Shaping of Steel" was shown to the chapter.

—Harry Midgley

Lima ASTE Members Hear George Eglinton

Lima, Ohio—George Eglinton, Eglinton Carbide Products, Wynadotte, Mich., presented the technical program at the January 15 meeting of the Lima ASTE chapter. About 65 members and guests attended the session at the Barr Hotel.

Coffee speaker for the program was Walter Graf, city engineer at Lancaster, Ohio, and chairman of the state registration board for professional engineers. He spoke on the advantages of being a registered professional engineer.

Mr. Eglinton addressed the group on "The History and Development of Carbide Dies." Illustrated with slides, his lecture showed the varied use of carbide dies in metal-stamping industries producing parts ranging from bottle cap inserts to laminations for electric motors.

—W. E. Waters

Granite State Members Tour Technical Institute

Manchester, N.H.—New Hampshire Technical Institute opened its doors January 13 for a tour and banquet meeting of the Granite State ASTE chapter. Nearly 100 members and guests attended the event which also included several exhibitions and demonstrations, a reception, and a program of entertainment.

Featured speaker was John P. Walsh, director of the institute and head of the state divisions of vocational education, who spoke on the subject "School and Industry Cooperation Is a Two-Way Street."

After dinner entertainment was provided by Roland Gauthier, Mrs. Mabel Duffy, Roland Randall, Mr. and Mrs. Harry C. Hunter, and the Wheatley brothers. *—Joseph L. Rousseau*

"In appreciation for your many years of guidance, and because to us you're a grand guy," was the expression of presentation as J. R. Fitzsimmons, founder and board chairman of the Die Supply Co., Cleveland, and member of the Cleveland ASTE chapter, received a large, bronze plaque from his employees. Making the presentation was E. M. Brumagin, left, sales engineer for the firm.

Edwin Pearne Addresses Tri-Cities ASTE Members

Nearly 100 members and guests of the Tri-Cities ASTE chapter attended the January 14 meeting to hear Edwin M. Pearne, quality control engineer, Do-All Co., Des Plaines, Ill. He showed a film on gage blocks and their applications and gave an actual demonstration of the gage blocks, using DoAll gage holders to show the different combinations available with various gage holders.

A nominating committee was named to select candidates for the election of officers. Appointed to serve were Otto Reller, George Greer and Joe Selino. The meeting was conducted by Robert Cannon, second vice chairman.

—Melvin Winterlin

Dr. Osborn Discusses Induction Heating

Lancaster, Pa.—Dr. Harry B. Osborn, Jr., third vice president and a director of ASTE, presented the technical program at the January 20 meeting of the Greater Lancaster ASTE chapter. Held at Franklin and Marshall College, the meeting was attended by 85 members and guests of the chapter.

As technical director of Tocco Division of The Ohio Crankshaft Co., Cleveland, Dr. Osborn chose for his subject "Induction Heating." He used slides for illustration of the highlights of his discussion and conducted a question and answer period at the close of the session.

A group of students from the Stevens Trade School were guests of the chapter for the technical speech and dinner which preceded it.

—Kenneth Bernhardt

Deep Drawing Topic at San Diego Meeting

San Diego—More than 100 members of the San Diego chapter met January 13 at the El Morocco to hear a talk by Stanley R. Cope on deep drawing of stainless steel, nickel and high-nickel alloys. Mr. Cope explained the design of dies, proper die materials, selection of presses and pressures required to draw the metals, blank holding pressures and drawing compounds.

His discussion also covered the making of all shapes of shells, formulas for diameter reductions, cutting and drawing clearances, and a general summary on the fabrication of high-tensile low-alloy steel.

During the business session the nominating committee was elected to select candidates for the 1953 slate of officers. They were Clyde Good, Bill Sheer and Jack McClure.

A progress report on the education program at San Diego Vocational School and at State College was reviewed by the chairman of the chapter's education committee, Edward M. Getzoff. *—William Keeler*

Judkins Describes Details of "Method X"

London, Ont.—Meeting January 15 at the Cobblestone Inn, about 75 members and guests of the London-St. Thomas chapter heard a talk on "Method X" by M. F. Judkins, chief engineer, High Temperature Alloys Div., Firth Sterling Steel Co., Pittsburgh.

A nominating committee was appointed at the business session to propose a slate of officers for the coming year. Named to make the selections were Cecil Ward, chairman, and Gordon Roberts and Robert Fraser.

The technical session at the December meeting was presented by John Lengbridge, chief products engineer, Aluminum Co. of Canada. He spoke on "Deep Drawing of Metals," using slides to illustrate the different ways metal flows in a drawing operation, where the weak points occur, and how to overcome the many troubles in such an operation. Chairman Al Ward introduced the speaker. *—Robert Fraser*

Promoted at Ford

A past chairman of the Windsor ASTE chapter, William Tyson, has been named plant manager for Plant 4 of the Ford Motor Co. of Canada. He was formerly assistant general superintendent of Ford's Plant 2 in Windsor.

Hebert Discusses High Velocity Turning

Philadelphia—One hundred and fifty members and guests battled through snarled automobile traffic, caused by the Philadelphia transportation strike, to hear the January technical talk on "High Velocity Turning." J. C. Hebert, general sales manager of Jones and Lamson Machine Co., assisted by George R. Moring, chief sales engineer, gave a detailed talk to explain their company's research into high surface speeds using carbides. The meeting was held January 15 at the Engineers Club.

This practical research was begun about six years ago using a 75-hp automatic lathe. A plan was established to experiment with tool shapes and carbide grades at elevated surface speeds.

The first project involved a steel bearing race SAE 52100, which tests proved could be turned, faced, grooved, chamfered and bored at 600 to 700 sfm, or better than twice as fast as usually recommended. Results showed very good tool life, about 250 pieces per grind.

Another alloy steel part tested showed that 1100 sfm was not too much. It was determined in these tests that a heavy volume of coolant, with 15 to 20 psi pressure, should be carefully directed to the top and bottom of the tool. Under such conditions the work and tool did not overheat, and the chips were grey, not blue.

Other tests with a progressively increased surface speed showed that the grey appearance of a bored hole changed to a bright shine at 600 to 700 sfm, which lengthened tool life and permitted better size control in the bore.

Mr. Hebert explained that these benefits accompanied the efficient separation of the metal, wherein the physical structure below the surface is not disturbed greatly by the cut.

—Vincent J. Powers

Binghamton Party Draws Large Attendance

Vestal, N. Y.—Members of the Binghamton chapter held their annual ladies' night program and dinner dance December 3 at the Vestal American Legion. More than 100 persons attended the party.

A turkey dinner opened the evening's activities. Tables were decorated in the Christmas theme. Music for dancing was provided by Eddy Reen and his orchestra. Arrangements for the event were made by Charles King, chairman of the program committee.

—Eleanora Freeman

Coming MEETINGS

DETROIT—March 16-20. Leadership Conference and 21st Annual Meeting of ASTE.

CHICAGO—March 2, Keyman's Club. "Induction Heating and the Tool Engineer" by Dr. Harry B. Osborn, Jr., technical director, Tocco Div., Ohio Crankshaft Co., Cleveland, and third vice president of ASTE.

CINCINNATI—March 5, joint meeting with ASME. "A Century of Progress of the Machine Tool" by Swan Bergstrom, vice president, Cincinnati Milling Machine Co.

CLEVELAND—March 13, Carter Hotel. "The Science of Precision Measurements" by John Harrington, chief engineer, The DoAll Co.

FAIRFIELD COUNTY—March 4, "Induction Heating" by Dr. Harry B. Osborn, Jr., technical director, Tocco Div., Ohio Crankshaft Co., Cleveland, and third vice president of ASTE.

GOLDEN GATE—March 18, 6:30 p.m., Curtolas Restaurant, Oakland. "Recent Developments in Cutting Tools" by W. R. Fraser, chief metallurgist, Union Twist Drill Co., Athol, Mass.

GRAND RIVER VALLEY—March 6, 7:30 p.m., Moffat's Hall, Galt. "Latest Methods in Milling Machine Practice" by a representative of Cincinnati Milling Machine Co.

GREATER NEW YORK—March 2. "Screw Threads, Their Gages and Quality Control Problems" by Stanley G. Johnson, sales manager, and F. B. Murphy, field manager, Johnson Gage Co., Bloomfield, Conn.

HARTFORD—March 2, Hartford Gas Auditorium. "Precision Tumbling" by N. Lee Watkins, Almco Div., Queen Stove Works, Albert Lee, Minn.

KEYSTONE—March 5. "Induction Heating and the Tool Engineer" by Dr. Harry B. Osborn, Jr., technical director, Tocco Div., Ohio Crankshaft Co., Cleveland, and third vice president of ASTE.

LEHIGH VALLEY—March 20, 6 p.m., Hotel Traylor, Allentown. Installation of officers, films and social hour.

LIMA—March 12, 6:30 p.m., L. C. Schaefer, assistant manager of industrial engineering, Westinghouse Electric Corp., Lima, will review his recent busines strip to Europe.

LONG BEACH—March 11, 7:30 p.m. "Story of DoAll Machines and Equipment" by Vincent Berge, DoAll Co., Des Plaines, Ill.

NEW HAVEN—March 12, 8 p.m., Hotel Jarde. "Precision Measuring" by a representative of the Sheffield Corp., Dayton, O.

NEW ORLEANS—March 11. Installation of officers.

PEORIA—March 3. "Automotive Broaching" by Kenneth Macomber, Lapointe Machine Tool Co., Hudson, Mass.

PETERBOROUGH—March 5. "Design and Development of Special Machines" by C. P. Farr, chief engineer, Modern Tool Works, Ltd.

PITTSBURGH—March 6, 6:30 p.m., Sheraton Hotel. "What's New in Heat Treating" by E. J. Pavasic, Lindberg Engineering Co., Chicago.

PORTLAND (Me.)—March 13, 7 p.m., Columbia Hotel. "Tool and Die Salvage Welding" by Herman Grief, Eutectic Welding Alloys Corp., New York, N. Y.

ROCKFORD—March 12, 7 p.m., Lafayette Hotel. Speaker will be L. B. Bellamy, national president of ASTE.

SAGINAW VALLEY—March 19, 7 p.m., General Motors Institute, Flint. "The Professional Engineer" by Mr. Cowing, president of G.M.I., and Mr. Roat, master mechanic, AC Spark Plug.

SANTA CLARA VALLEY—March 17, 6:30 p.m., Hotel De Anza, San Jose. "What's New in Cutting Tools" by Dr. W. R. Frazer, chief metallurgist, Union Twist Drill Co., Athol, Mass.

TOLEDO—March 11, 6:30 p.m., Hotel Secor. "Machine Tools" by Swan E. Bergstrom, vice president, Cincinnati Milling Machine Co., Cincinnati.

TORONTO—March 4, 6:30 p.m., Oak Room, Union Station, Toronto. "The Design and Development of Special Machine Tools" by C. P. Farr, chief engineer, Modern Tool Works, Ltd., Toronto.

TRI-CITIES—March 11, 6:30 p.m., Rock Island Arsenal. "Modern Turning Equipment" by Mr. Brandenburgh, vice president in charge of sales, Monarch Machine Tool Co., Sidney, Ohio.

TWIN CITIES—March 4, St. Paul Vocational School. Apprentice Night.

TWIN STATES—March 11, Trade Winds Cafe, Springfield, Vt. Installation of officers.

West Coast News

By Andrew E. Rylander

As usual since coming to the Coast, have had a busy month; not even time for the garden. But then, it rained!!! Guess I'll have to practice up on saying "no" although, as for that, this camel can still take on a few more straws. Getting around, however, I spent a few interesting hours at Westinghouse Electric's Sunnyvale plant, sales engineer John S. Langwill conducting. No restrictons on seeing, just on telling . . . too much.

Visiting some of these California plants is just one frustration after another for a writer. At that, it's an education and also a deflation of ego for Easterners who may have ideas that the industrial horizon is limited to the sunrise side of the Mississippi. They're doing big things here on the Coast—with, of course, some assistance from the East.

Giant Turbo-Compressor

For instance, Westinghouse Sunnyvale is building the "biggest yet" in the form of a gigantic turbo-compressor which, when completed, will be part of a defense gadget twice the length of a football field. The largest of the steel forgings, and likewise huge castings, come from the East, there being no forge shops or foundries on the Coast capable of handling such colossi . . . as yet. Right now, it's a case of cooperation by U. S. industry, north, east, west, south.

The plant is doing a wonderful job on welded steel fabrication, this including a huge rotor housing that taxes the capacity of a 40-ft. vertical boring mill. As fabricated, maximum out-of-round of the ID is less than ½ in., plenty close considering a 30-ft or more diameter. Anyway, it cleans up nicely in the boring. Contour machining of rotor blades—some 5 x 2 ft in area—is also a revelation in tool engineering; however, the ideas for this job came from Rockford and Detroit. No sense in us Californians getting a Texas complex.

Outside of some of the buildings which date back toward the turn of the century, the plant is as modern as tomorrow. Manufacturing equipment is excellent. This holds especially for the light manufacturing division, of which G. W. (Bud) Hilton, program chairman of Santa Clara Valley chapter, is in charge. Thanks to all for the pleasure of the visit! I'll be back for more . . . I hope.

Took in Santa Clara Valley chapter's January meeting, held at the Red Coach Inn down Los Pagos way, but meandered around a bit on account of forgetting the name of the place. Seems nobody'd heard of a Red Dog Inn. Got there regardless and, during the handshaking, met John T. McCarthy, Frank C. Cavanough of whom I'd heard a lot, Howard (Dutch) Forster of Chicago-Latrobe, and Dick Cross, the latter relaying greetings back to his Detroit buddies.

Also met Morris Gottlied of the California Institute of Tool Engineering (an Acme school) who either sponsored or assisted the guest speaker, Stanley Cope of the Acme School of Die Design Engineering, South Bend. Either way, he did a good job. Hadn't seen Stan in many moons but he looked as good as ever and gave a fine talk with special stress on deep work. The boys got their money's worth in die know-how, for despite a late start, Stan held our interest to the last slide.

As usual with Santa Clara Valley chapter, attendance was good and membership enthusiasm at a high level. Carl Kaiser, assistant professor of engineering at San Jose State who heads the recently initiated course in tool engineering sponsored by the chapter, reported an attendance of 72 at the opening session. Swell! Carl is a live wire and certainly there can be no complaint over instructors, all of whom are veterans in tool engineering.

Golden Gate Program

The following evening, took in the Golden Gate meeting, held at the El Jardin, San Francisco. On the way, was picked up by Art Lewis, ch'man of San Fernando chapter, and Karl Bues, and so conserved shoe leather. Every little bit helps. It was good to see Ted Rohrer all mended up and back in the chair. His "state of the union" message, and reports from com'tee heads, augurs well for the chapter.

Seems that Uncle Sam had balled up the mailing of the bulletins, as a result of which Dave Gustafson and Ted Lindquist had been phoning members up into the wee hours, night before, to insure attendance. The Golden Gate officers are really in there pitching for "dear old Rutgers." Dave got a big hand for the face lifting of the chapter meeting bulletin, and Ted likewise for his work on the chapter roster, to be out by the time this letter goes to press.

Found myself seated next to Angelo Dell 'era, who runs the Dell 'era Engineering Co., San Francisco. He ha some nice comments on the marked in provement of THE TOOL ENGINEE all of which is in line with the genera consensus of opinion along the Coas

Having heard Stan Cope the evenin before, I left before the end of his talk No lack of interest in the subject; it' just that there's a "long, long, trai awinding" to Walnut Creek. As fo Stan, we need more speakers like him

Coming back to frustrations, I migh remind you that the Californians are the country's greatest consumers of cof fee. So, thinking that a look-see into one of the Coast's coffee processing plants might have its interesting phases, I made a visit. But, I mustn't write about anything I saw, or mention the name of the company. I said "Okay, but look, I was roasting coffee before you were born, and all you've done is to mechanize what I did by hand. At that, you've got good coffee and I'll keep on buying it. But, I'll violate no confidences and so will keep the brand I use a deep, deep secret." Does it pay to advertise?

And that's all for now. The sun is shining, the birds are singing and the great outdoors is calling and so I'm going out and grub in the adobe. See you next month.

Positions Available

ENGINEERING LEADERS FOR SPECIAL MACHINERY DESIGN—Engineering squad leaders for builders of special machine tools. Must be thoroughly experienced in machine design, fixture design, multiple-drill head design and capable of program leadership. Permanent employment with prominent manufacturing company located in pleasant midwest city. Unless you are qualified, please do not apply. Write to Box 508, The Tool Engineer, 10700 Puritan Ave., Detroit 21, Mich.

TOOL AND MACHINE DESIGNERS—One of Cincinnati's largest permanent design firms has openings in their own office for experienced machine, product and tool designers, and detailers.

Recent engineering graduates or students will also be given consideration. These are permanent positions with a substantial, stable leader in the field. We can offer top starting wages, modern working conditions, paid holidays, vacations, and other benefits. Our policies assure varied experience and unusual opportunities with a future.

New Employees would be expected to settle on a permanent basis in Cincinnati. Please send resume to Cincinnati Designing, Inc., 37 W. Seventh St., Cincinnati 2, Ohio.

News in Metalworking . . .

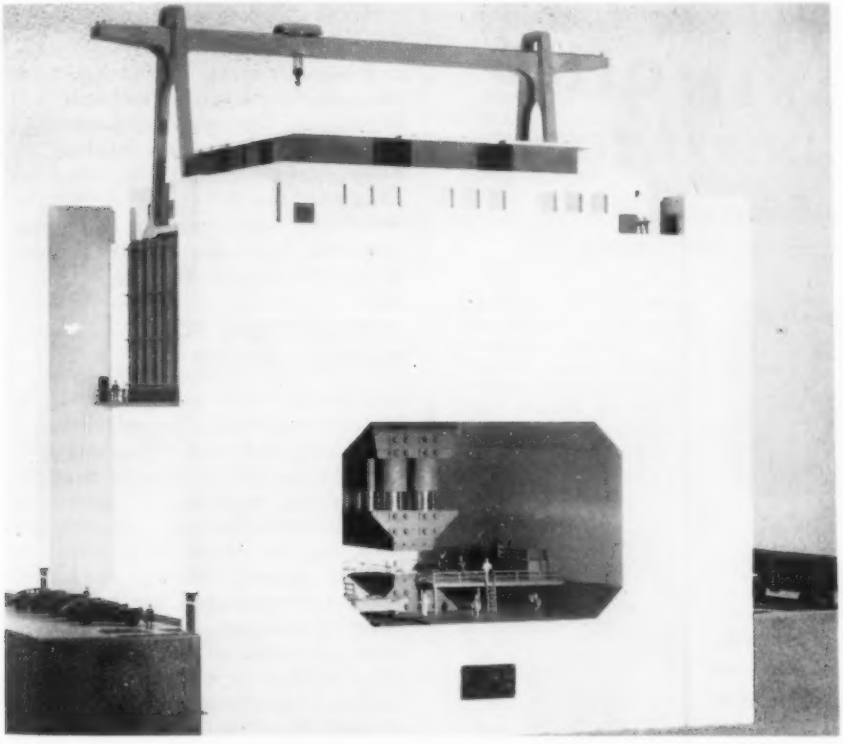
PRESS WORLD'S GIANT COMES TO LIFE

Throatless Press Co. has made its bow with the presentation of this design concept in which its co-owners, The Austin Co., national engineering and construction firm, and The Hydraulic Press Mfg. Co. have pooled resources and know-how to bring heavy presses with capacities of even more than 75,000 tons within the reach of existing machine tools and construction equipment.

The massive monolithic concrete structure serves the three-fold purpose of supporting, suspending and completely housing all of the required press elements and operations and also provides the counter force required to resist the tremendous upward pressures developed in forming the huge parts required for the largest jet bombers and transportation planes. By eliminating the need for giant columns used to connect the head and base of conventional presses, this design provides 360-degree access for placing and removing dies and work of any size required in closed die forging, rubber pad forming and die quenching operations.

The 75,000-ton unit represented by this model would have more than four times the capacity of the biggest presses now in operation on this side of the Iron Curtain and more than twice that of the German press which the Russians are now believed to be operating beyond the Soviet border.

The gantry crane on the roof has a capacity of 100 tons and is used to handle power units and the huge 90-ton pressure vessels mounted on the exterior walls and in which pressure necessary for press operation would be built up.



NEW PLANT FOR SKINNER CHUCK

The Skinner Chuck Co. recently completed a modern plant at Edgewood Ave., New Britain, Conn., which provides complete facilities for both Skinner Chuck and Skinner Electric Valve Div. In addition to providing 85,000 square feet of floor space, it offers every means for modern production.

Besides housing all general offices and engineering departments for both divisions of the company, facilities in the plant layout include experimental and development laboratories, enclosed trucking dock, heat-treating room and the latest materials handling equipment.

Work flow has been arranged for straight-line production from receiving, through manufacturing, to shipping.

ALUMINUM OUTLOOK BRIGHT

Assuming no extension of hostilities, there will be enough aluminum for everyone who wants it was the prediction of Richard S. Reynolds, Jr., president of Reynolds Metal Co. who was summing up the aluminum industry's past year and evaluating its future.

Close to 1.9 billion pounds was produced in 1952 which set an all-time peak. However, this did not fully reflect the expansion already completed, he said, because the output would have been greater if it had not been for substantial production losses suffered by the industry due to power shortage resulting both from man-made and natural causes—such as the severe drought which lowered substantially the water power in the Northwest and TVA areas.

According to Mr. Reynolds, the big surge in actual production is coming in these next two years "with an output of 2.5 billion pounds expected in 1953 and about 3.0 billion in 1954." Following the completion next year of all planned expansion, this country's capacity should be about 3.5 billion pounds, or a 127 percent jump since Korea.

The Reynolds Co. specifically will have an annual producing capacity of 830 million pounds when its expansion program is completed this year. This production will be more than five times as great as it was at the close of World War II.

However, there is one attendant factor in the consideration of aluminum. With its becoming more readily available, many new uses are developing. In the few years since the war, it has achieved the status of a major basic metal, and its many advantages are gaining recognition by American industry.

SERVICE MACHINE BUILDS

Service Machine Co., Elizabeth, N. J. has recently completed a plant for general tooling and production. The location is adjacent to both the New Jersey Turnpike and U. S. Highway No. 1 with Jersey Central R.R. siding facilities. The plant area is devoted entirely to engineering, heavy machine manufacture, tool and die making, light assembly and machining. It now utilizes 21,000 square feet of floor space, and is said to be the largest general machine shop in the North Jersey area. Equipment includes a wide range and variety of different types to insure high precision machine work, manufacture and tooling.

MATERIAL HANDLING GROUP SEEKS EQUIPMENT STANDARDIZATION

The Caster & Floor Truck Manufacturers' Association is conducting an Equipment Standardization Program aimed at standardization and simplification of part sizes, descriptions, capacities and applications of products classified as Manual Material Handling Equipment, Casters and Wheels.

Economies evident in the field of engineering through greater interchangeability and use of standard specifications leave no question about the value of standards from the standpoint of economy and efficiency. To the manufacturer, standardization means fewer materials and a smaller variety of parts with longer runs and greater continuity of operations. The user benefits through concentration on a reduced variety of products, improvements in deliveries, and simplified servicing.

According to the Association, it is hoped to obtain eventual standards acceptable to manufacturers and users throughout the industry. The C&FTMA is seeking the active, voluntary cooperation of all those persons involved in the design, production and use of a great variety of products in the industrial caster, wheel, and hand and floor truck classifications.

Mr. James S. Hanson, Vice President of the Fairbanks Co. of New York, who is general Chairman of the Equipment Standardization Program, has announced the formation of six Product Standardization Task Committees, covering three classifications of trucks skids, wheels and casters.

Thus the Association actually is embarking on six different standards programs, each of which will be largely the responsibility of members of the various product standards task committees. Each Product Task Committee is asked to prepare a standard nomenclature; prepare a classification and description of the product types; recommend standard sizes; recommend capacities, recommend applications; and recommend standard testing procedures.

As the various Product Task Committees complete their work, recommended standards or simplified procedure will then be submitted to user groups, non-member manufacturers and interested government agencies. After agreement of users and the industry has been obtained the standards will probably be submitted for review to the American Standards Association. It is anticipated that complete standards will eventually be published and distributed by the Association.

Those individuals and groups interested in contributing information and suggestions, thus speeding preparation of the standards and insuring complete coverage of all products concerned, are requested to write the Equipment Standardization Committee, c/o Caster and Floor Truck Manufacturers' Assn., 27 East Monroe St., Chicago 3.

DISTRIBUTORS FORM SERVICE GROUP

A group of tool and industrial supply manufacturers has established a distributing and warehousing organization. As the plan is pictured in operation, these corporations, known as Manufacturers Industrial Supply Corporations, are located in principal industrial centers, serving as branch offices and warehouses for their manufacturing members. They will also sell tools and industrial supplies, manufactured by their suppliers to established wholesale distributors, but not to users directly.

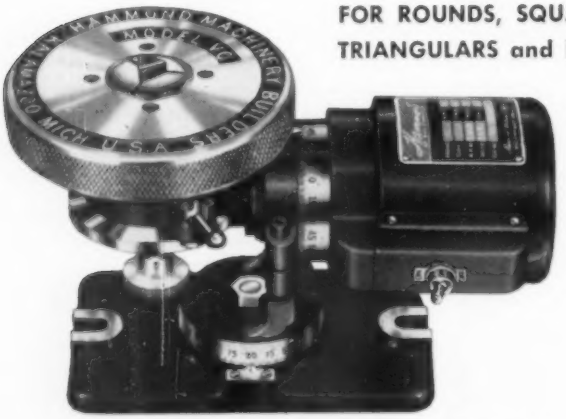
According to the announced plan, the main purpose of this corporation establishment is to secure stabilized distribution of suppliers' products regardless of economic times, and to give suppliers control of that distribution.

Several of them are now in operation including one in Illinois, one in California and one in New Jersey. Interested manufacturers may communicate with Howard Learn, general manager of the organization, 5459 W. Division St., Chicago 51.

Hammond OF KALAMAZOO
GOOD MACHINERY SINCE '82

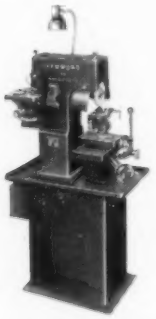
FAST ACCURATE GRINDING
of SOLID CARBIDE INSERT TOOLS

FOR ROUNDS, SQUARES,
TRIANGULARS and RECTANGULARS



MODEL VC, Style M Motorized Solid Carbide Insert Grinding Fixture. Style H, without motor also available. Write for Bulletin No. 235.

THE Hammond Solid Carbide Insert Grinding Fixture pays for itself in a few weeks. Offers a fast, economical and accurate means of grinding chip breaker grooves in round, square, triangular and rectangular shapes and for rough and finish grinding of dull and damaged carbide inserts. Motorized Style M with lug base can be mounted on most tool and surface grinders and Hammond CB-76, CB-77 and CB-77W Chip Breaker Grinders.



HAMMOND MODEL CB-77 CHIP BREAKER AND DIAMOND FINISHING GRINDER can be supplied with both the standard Any Angle Vise and the Model VC Solid Carbide Insert Grinding Fixture.

BUILDERS OF AMERICA'S MOST COMPLETE LINE OF CARBIDE TOOL GRINDERS

Hammond Machinery Builders INC
1661 DOUGLAS AVENUE • KALAMAZOO 54, MICHIGAN

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PLASTIC MOLDING— TOP TURNOUT REACHED

With 10 million dollars' worth of large presses and electronic equipment operating at peak capacity, molders of large thermosetting plastic parts see the need for a 50 per-cent increase in production facilities within the next six months. This was established by a capacity survey made recently for the Committee on Large Plastics Moldings of the Society of the Plastic Industry.

It may surprise American industry to find that excellent facilities exist in this country for the production of large thermosetting plastic moldings. Giant presses capable of exerting pressures up to as high as 7,000,000 lb and costing up to as much as $250,000 are available to produce the large moldings that are used, for example, in TV console cabinets, unit air conditioners, and refrigerators. Electronic heating equipment many times more powerful than most radio broadcasting stations is used to preheat the plastic material before it is molded. This cuts down molding time and hence increases the productivity of each press—making it possible to produce more pieces per hour.

According to the survey, key men in the field's leading companies report that production equipment to make the large moldings now is operating at 100 percent of capacity. In addition, the survey revealed that these molders now are working with industrial designers and manufacturers on many new thermosetting plastic housings from urea, pheonlic, and alkyd materials for appliances, machinery and even furniture items.

Figures for the industry during the past couple of years emphasize its rapid growth. In 1948, only 10,000 large plastic cabinets were molded. Over 160,000 units were molded per month during 1952, with the prediction that 1953 production will exceed 240,000 units per month.

SUBSIDIARY OF J&L BECOMES DIVISION

The Jones & Laughlin Supply Co., Tulsa, Okla., a wholly-owned subsidiary of Jones & Laughlin Steel Corp., has become a division of J&L, with all of the assets transferred to the parent corporation. Canadian assets of the J&L Supply Co. were sold to the J&L Steel Sales Co., Ltd., a Canadian subsidiary which will carry on the Canadian business previously conducted by the old firm.

The newly-named Supply Div. will be headed by Rainey Elliott, formerly vice-president and director of the Supply Co. He now is general manager of the Division.

Backstand Belts save 2 hours per day!

Armour Backstand Belts save 2 full hours per operator per day for steel tube company*

In removing burrs and grip marks from steel tubing, a well-known company* found they saved more than just the two hours per day operators had been given to make set-up wheels. Backstand belts outlast 4 to 5 set-up wheels—and without dressing they remain flat and true. And backstand belts give a better finish, due to their uniform grit.

Belts are only one of the many forms of Armour coated abrasives. There are more than 30,000 different varieties in grit size, backing, etc. We have sheets, discs, rolls, tubes—and specialties to meet your specifications. Your industrial supply distributor will tell you about this complete line. Call him today!

And, today—mail the coupon below for your free copy of our booklet, "How to Store Coated Abrasives." It can help you, too!

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ANOTHER EXAMPLE OF *KELLER Air Tools engineered to industry*

KELLER Airfeedrills outperform advance estimates

These eight Airfeedrills bore 12 holes in 24ST aluminum parts, and make possible a sustained production rate of 600 and more parts per hour—twice the output of the most optimistic advance estimates for the job.

Facts in Brief about Keller Airfeedrills

Accurate holes without costly fixtures

Attaches in any position, at any angle

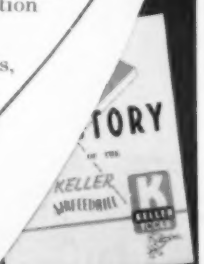
Entirely air-controlled and operated

Easily shifted from job to job

Pneumatic cycling to speed production

Drills metal, wood, composition, plastics

Used in close centers, and in tight places



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Keller Tool Company, Grand Haven, Mich.

Please send me a free copy of your booklet titled, "The HOLE Story of the Keller Airfeedrill."

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FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-114

COLUMBIA BUYS TWO TOOL CONCERNS

Columbia Machinery and Engineering Corp. has acquired all of the assets and manufacturing rights of two Connecticut firms—Bridgeport Safety Emery Wheel Co., Inc. and the Diamond Machine Co. The acquisition climaxed several months of negotiations, and brings together three of the oldest machine tool producers in the country. For the time being, Columbia plans to integrate the two Connecticut companies with its Hamilton, Ohio division.

According to James A. Walsh, chairman of the board of Columbia, they will continue the manufacture of the full Bridgeport line of medium and heavy grinders and saws. However, activities in connection with the Diamond Co. will be limited for the present to field service. Mr. Walsh said future plans involve development and manufacture of better grinders generally for metalworking. Ideas relative to the application from a methods standpoint of usage of grinding machines in the basic machine tool industry, together with Columbia's expansion policy prompted purchase of the companies.

FORMSPRAG TO HANDLE OWN SALES

Shepard Barnes, new president of the Formsprag Co. has announced that the five-year sales agreement with Morse Chain Co. for distribution of Formsprag clutches has been terminated. He said a staff of Formsprag sales engineers now will service manufacturers, and a network of distributors will carry standard stock, and serve the user.

ADD THIRD PLANT

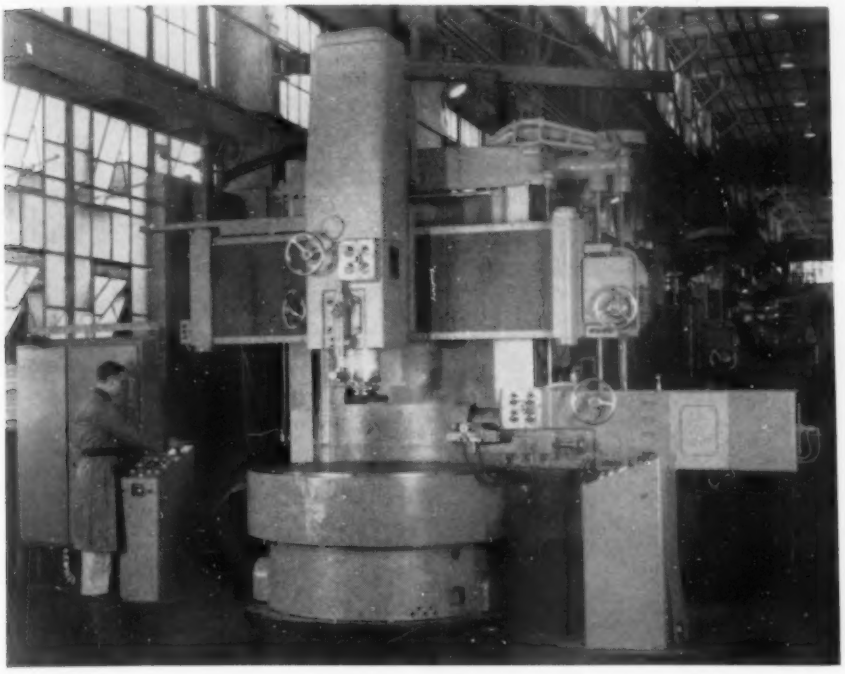
Mechaneers Inc. of Bridgeport, Conn. has acquired Plant 3 at Bridgeport Municipal Airport, with land and buildings located adjacent to the field. In announcing this, John A. Frink, president, said that this increase in productive space will permit rapid delivery of all types of equipment now manufactured by the firm, as well as permitting maximum utilization of its fleet of planes to assure prompt delivery of rush requirements.

ORGANIZES SUBSIDIARY

Maysteel Products, Inc. has organized a subsidiary to be known as Gleason Reel Corp. This corporation will manufacture and distribute the industrial reels which J. L. Gleason & Co., Inc. formerly produced for more than 35 years in its Cambridge, Mass. plant.

The company also announced plans to expand and further develop the market for these automatic take-up reels.

Tools of Today . . . .



Vertical Chucking Grinding Machine

The Bullard Company, Bridgeport, Conn. announces the introduction of a vertical chucking grinding machine in six sizes, 30, 36, 42, 54, 64 and 74 inches, to meet present day requirements for conveniently grinding the larger sizes of work.

The combined use of mechanical, hydraulic and electrical components provides the accuracy, flexibility, power and ease of operation so essential in a precision grinding machine.

A variable speed drive provides infinitely variable table speeds, from creeping to top speed, as specified by the customer. Reversing controls permit the grinding spindles to be run in either direction. Grinding spindle speeds can be furnished to meet customer's requirements, with maximum motor hp rating for the main head grinding spindles of 10 hp and for side head grinding spindles, 5 hp. The grinding heads are equipped with a hydraulic drive for extremely smooth reciprocating action. The rate of reciprocation is controlled by a selector dial having twelve, set orifice type valves for metering the flow of oil. This control permits the operator to select any one of twelve reciprocation speeds. Ideal grinding conditions can be easily repeated by turning the dial to a numbered orifice position.

A fine feed and an adjustable dwell are provided for grinding up to shoulders in combination with any of the twelve available reciprocating speeds. This fine feed and dwell can be used together or independently and can be set for the bottom, top or both ends of the stroke. Readily adjustable cams control the length of stroke and positive stops assure accuracy. The main head can be swiveled 30 degrees to the right or left of center and the side head swivels 20 degrees above or below the horizontal position.

Dual control desks with push-button controls provide maximum ease and efficiency for machine operation. Being located one on each side of the machine, an operator can control the machine from the most advantageous side. Desks are interlocked so that only one is operable at any time. Wheel dressers, hydraulically operated, with adjustable reciprocating speeds are mounted on each head.

To obtain the greatest possible rigidity and accuracy, the grinding wheels are mounted on the motor armature shaft. The grinding spindle housing incorporates the motor field. Hardened and ground square lock ways for both heads are concealed and protected within the head housing. The cylindrical grinding wheel housing or motor frame does not constitute a reciprocating bearing member. Grinding spindles can be readily removed from the square lock slide within the head, permitting a spare to be quickly installed.

Nonmetallic surfaces bear against the hardened way and adjustable taper gibs are provided for maximum uniform rigidity. Grinding slides within the heads are always in full bearing. Overhang is constant for all grinding strokes. All exposed bearings are protected by scrapers and grit shields. The neoprene guard for the cross rail bearings is ribbed with steel stays to assure a tight fit. Infinitely variable reciprocating speed, hydraulically operated, wheel dressers are built into each head. The construction is such that the wheels can be properly dressed to specific requirements without upsetting the grinding cycle. Wheel dressers are equipped with their own independent reciprocating ways and therefore can be adjusted to obtain the optimum dressing conditions.

Inasmuch as proper lubrication is vital for rapid, steady reciprocation of heavy heads, and in order to provide automatic lubrication of the vertical chucking grinders, Trabon systems have been installed on the main and side heads. These units distribute oil, properly metered, to all bearings requiring lubrication at a rate adequate for that particular bearing. These lubrication units are interlocked so that they pump only when oil is required and when the grinding spindles are in operation.

Special attention has been given in the design of the machine to the safety of the operator. Electrical interlocks are provided so that the machine cannot be started unless the work is properly held by the magnetic chuck. Lock out switches are also provided to render the machine inoperative while setting switch cams for length of grinding strokes. **T-3-1151**

Stake Welding Machine

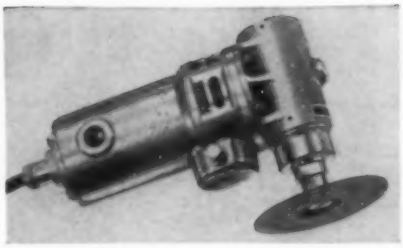
The Morton model A stake welding machine incorporates a new type of clamping arrangement. It offers flat clamping with no tendency for seam separation under load. It also offers less operator interference and better visibility in the welding area, it is claimed.

The stake, mounted on an air-actuated vertical slide, is supported and aligned at the outer end by a manually operated shot pin. Interlocking air valves protect the machine from improper operating sequence. A manually operated gage bar is built into the machine. High clamping pressure and other features incorporated in Morton stake welding machines are provided. Made by Morton Mfg. Co., Muskegon Heights, Mich. **T-3-1152**

Electric Hand Tool

The B-2 Diskette is a portable electric hand tool for high-speed grinding, filing, deburring, sharpening, sanding, polishing and other preparation and finishing jobs. Since it operates at higher speeds than conventional electric tools and its capacity is limited to a 4 inch disk, the Diskette is ideal for precision grinding or cutting jobs. Thus, it can be used as a production tool as well as for maintenance work.

All bearings are high-grade ball bearings especially suitable for the high speeds encountered with this tool. The air intake cover, at the base of the tool, is now of cast aluminum to

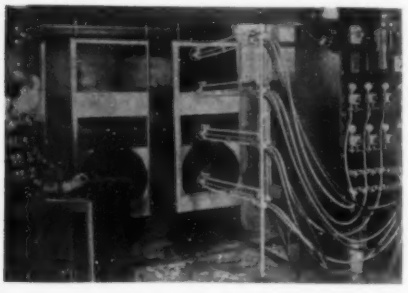


provide greater intake area for the cooling air. A double cooling fan has also been added to further increase cooling efficiency. These improvements will allow operators to use the tool for extended periods without fear of overheating it.

A Universal motor for 110-120 volt a-c or d-c current, gives the spindl shaft a no-load speed of approximatel 9000 rpm. The B-2 model incorporate a collet chuck in the spindle for al attachments. This reduces the over hang on certain attachments by almos one inch, thus assuring accurate cen tering of any attachment and elimina tion of vibration during use. For case where the Diskette is to be used pri marily with composition disks, a spe cial threaded adapter collet is avail able. Made by Franklin Balmar Corp. Baltimore, Md. **T-3-1161**

Paint Spray

The Ionic-Gun for electronic paint spraying is designed for use with a wide variety of adapters suitable for almost any industrial or commercial application. Installation is simplified with this method and most of the mystery of installing and operating such equipment is removed. No skilled labor is required and production is increased. This spraying unit was designed on the principle of charging the paint elec-



tronically within the spray apparatus itself. Older installations required the use of external, electrically charged screens, which did not give uniform ionization of the pain spray, with the result that these units were efficient only for painting flat or smooth surfaces. With the Ionic-Gun, paint is highly ionized so that it differentiates between painted and unpainted surfaces, producing an even finish and penetrating into all cavities and crevices. Consequently, less paint is used in actual operation and product quality is increased significantly. The actual saving in most cases amounts to over 60 percent of the paint used by conventional methods or, to state it differently, only a total loss of 2 percent of the paint sprayed.

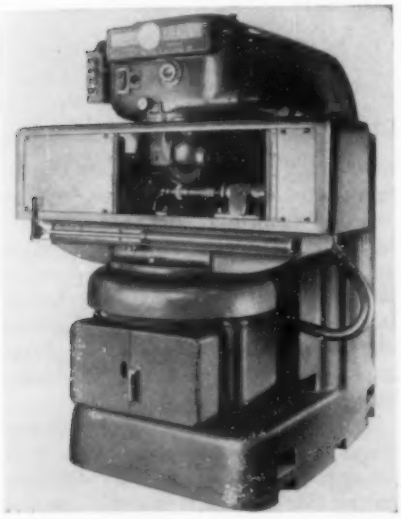
This paint spraying unit includes an Ionic high potential power supply and control. Made by Scientific Electric Co., Garfield, N.J. **T-3-1162**

USE READER SERVICE CARD ON PAGE 133 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

JIG and FIXTURE
COMPONENT PARTS
Eliminate the designing and making of clamps and other fixture parts. LODDING makes them for you.
LARGE FACTORY AND DISTRIBUTOR STOCKS ASSURE QUICK DELIVERIES.
LODDING
Write for CATALOG
showing 365 items that can save you time and money.
LODDING, Inc.
WORCESTER, MASS.
FOR FURTHER INFORMATION, USE READER SERVICE CARD, INDICATE A-3-116

Gear Shaver

A mechanism has been developed which, when built into a diagonal gear shaving machine, provides automatic precision up-feed in selected increments throughout the shaving cycle and automatic return to the proper backlash position for loading and unloading at the end of the cycle. This offers the user the choice of either conventional or diagonal shaving in the same machine.



When shaving diagonally the cycle is no longer limited to two strokes. It may now include several cutting strokes each with its own increment of up-feed and, in addition, one or more idling strikes. Cycle time, however, notwithstanding the greater number of strokes, has been decreased due to the very rapid up-feed and increased cycling speed. Increments of up-feed may be constant or varied, but each is precisely controlled.

The net result is higher gear production, greater accuracy in the product and an increase in cutter life of up to 200 percent.

When using conventional shaving the operator does not have to use a handwheel to bring the work gear into shaving mesh with the cutter after loading, nor to lower it out of shaving mesh for unloading. These operations are now a part of the automatic shaving cycle and as such remove any possibility of serration marks on gear-tooth surfaces.

In the machine illustrated, which is equipped with the automatic splash guard, the shaving cycle begins with the splash guards open and the table in the proper backlash position for loading. The work gear is placed between centers and the start button pressed. The splash doors close, the flow of collant starts, the table moves upward to bring gear and cutter into shaving mesh, cutter rotation begins and the first shaving stroke gets under way. At the end of a predetermined number of shaving and idling strokes, cutter rotation stops, coolant is turned off, the table resumes its initial position, the splash guards open and the shaved part is unloaded. The entire cycle is automatic. All the operator does is to unload the finished gear, replace it with an unshaved gear and again press the start button.

The amount and accuracy of up-feed is governed by a double-sided master cam and actuated mechanically. Thus, each knee movement is fast, positive and extremely precise.

In a typical case the knee rises approximately 0.022 inch from the backlash position for loading or unloading to bring the work gear into shaving mesh. If the feed for the initial cutting stroke is 0.022 inch the total rise is 0.024 inch. This is accomplished by Red Ring differential feeding in one second in contrast with 7 seconds for other machines.

The cam is manufactured to accommodate a combination of various feeding cycles. If it is desired to reduce the number of cutting strokes only part of the cam surface is used in service. The flexibility of the feed mechanism is such that any desired cycle may be used. Repositioning or changing the cam is a simple operation that requires only a few minutes.

The up-feed control mechanism is housed in a closed cabinet at the front of the knee. An observation window permits the operator, at any time, to read a circular scale which indicates the amount of up-feed for each cutting stroke. The cabinet may be locked to prevent any unauthorized changes in the shaving cycle.

Made by National Broach & Machine Co., 5600 St. Jean Ave., Detroit, 13.

T-3-1171

SLITTING DISCS
ANGULAR TOOTH SAWS
COMBINED DRILLS & COUNTERSINKS
SOLID TUNGSTEN CARBIDE COMMUTATOR SLOTTING SAWS
C.T. CO. INC. PROV. R.I. H.S.S.
C. T. CO., INC. T.C.
C.T. CO. INC. PROV. R.I. H.S.S.
Ⓡ METAL CUTTING TOOLS
For 30 years, we've turned out fine circular metal cutting tools. We've kept up with every advance — and we're ready now to meet the needs of tomorrow's more fully automatic production machines.
Circle R tools are made in a wide range of most-used sizes — and special sizes or designs will be made up promptly on your order. Write for details, or look us up in the phone book and talk with our nearest representative.
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TUBE CUT-OFF SAWS
SLITTING DISCS • SOLID & TIPPED TUNGSTEN CARBIDE SAWS • COMBINED DRILLS, COUNTERSINKS & CENTER REAMERS

Turret Lathe

Newly designed Schiess single column vertical turret lathes primarily intended for high-speed machining with carbide tools are now being distributed by Kurt Orban Co., Inc., New York.

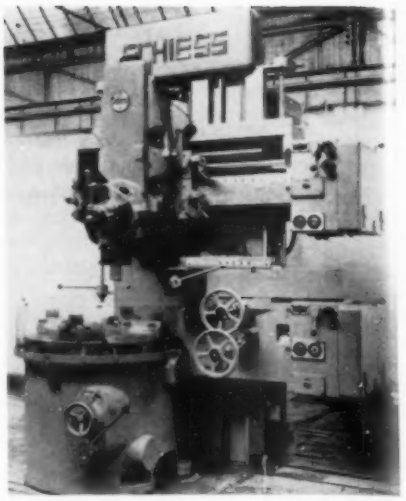
Available in 39, 49 and 65-inch turning lengths, the KE series has a unique all-vertical gear drive with the main motor mounted in a vertical position on the back of the machine and directly connected to the gearbox through a vibration-absorbing coupling. The gearbox is also vertically mounted so that changes in the direction of the drive are transmitted to the table without bevel gears. Vibration and play are thus eliminated.

Separate column and table base construction permits fine adjustment and close table tolerances against the column ways for both the crossrail and the vertical ram. Table runs on tapered roller bearings.

Vertical ram, crossrail and sidehead are all counterbalanced. A single lever unlocks, raises or lowers, and locks crossrail simultaneously by electro-mechanical controls. There are no bolts or nuts to loosen or tighten by hand.

Hydraulic preselection of speeds can be made while the table is rotating. The desired speed is set by a handwheel and read on an illuminated dial. A stop button slows down table; shift lever engages new speed in a fraction of a second. Sixteen spindle speeds in a ratio of 1 to 50 are provided. Maximum table speed is 310 rpm for KE 100 model.

Direction of feed and rapid traverse are actuated by conveniently grouped spring-loaded mono-lever controls; one for normal feeds, another for rapid traverse. Each lever permits normal directions of feed or rapid traverse plus angular compound feeds. The mono-levers are moved in the same direction as the desired feed or traverse movement, thus simplifying correct setting by the operator. Specially designed electro-magnetic disc clutches disengage feed instantly with no overriding or coasting.



A copying attachment with electric tracer can be supplied for use either on the crossrail and on the vertical ram or on the sidehead, as required. This unit may be attached to all KE machines at any time.

Three threads in ratios of 1:4:16 can be cut without changing gears. With a gear change of 2:1, threads from $1\frac{3}{8}$ to 30 per inch can be cut.

The standard $2\frac{3}{4}$-inch bore permits the use of the same cutting tools used on comparable American machines.

T-3-1181

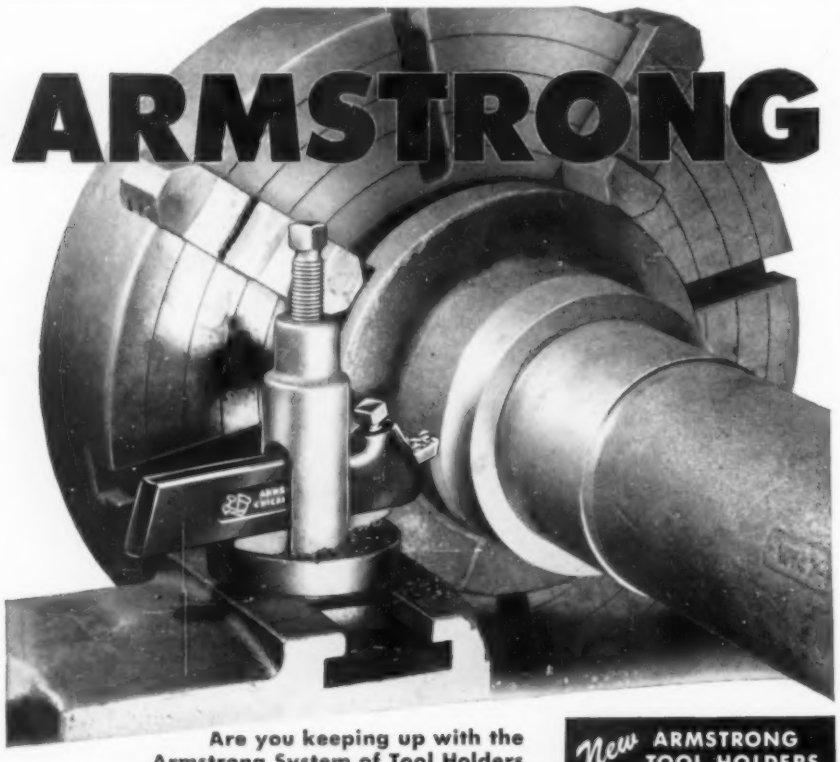
Drill Press Clamp

A drill press clamp, known as the Sta-Put clamp is designed to fit all popular makes and models of drill presses, and is said to hold virtually any shaped object square and secure for accurate drilling. It clamps on the drill press column and is quickly and easily adjusted. While operator is setting up material for drilling, the Sta-Put is swung to one side. It is claimed that the Sta-Put eliminates the need for C-clamps, vises or V-blocks. It reduces breakage of drills and because it eliminates slipping, it reduces the number of rejects and the spoilage of expensive material.

Tension is obtained by turning the adjusting knob on the top of the clamp. The pressure fork is adjustable from $7\frac{1}{4}$ minimum to $8\frac{1}{4}$ inches maximum from the drill press column.

Complete information may be obtained by writing to Clark and Sawyer, Inc., 2012 East Seventh St., Los Angeles 21.

T-3-1182



Are you keeping up with the Armstrong System of Tool Holders

Doubtless you are daily using ARMSTRONG TOOL HOLDERS that have been in continuous operation for many years. This is sound practice, for this means added profits without added tool costs. But to become complacent, so satisfied that you forget your ARMSTRONG TOOL HOLDERS, is unwise. The "Armstrong System" is a growing thing, with new types and sizes of ARMSTRONG TOOL HOLDERS constantly being developed to more effectively meet new machining conditions, or to take advantage of newly developed cutting materials.

With modern ARMSTRONG TOOL HOLDERS for each operation, you can greatly increase speeds and feeds. You can lower machining cost and further increase profits.

If you haven't kept up with the "Armstrong System" write for an ARMSTRONG Catalog and check to see that you are using the most efficient ARMSTRONG TOOL HOLDER for each operation on all lathes, planers, slotters and shapers.

New ARMSTRONG TOOL HOLDERS
ARMSTRONG Spring Form Threading Tool Holder
ARMSTRONG Spring Cutting-off Tools
ARMSTRONG Carbide Tool Holders for Carbide-Tipped Cutters
ARMSTRONG "C-A" Tool Holders for ARMALOY (Cast Alloy) Cutter-Bits

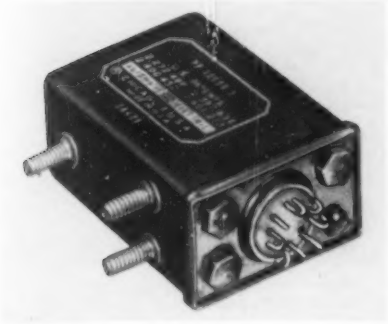
WRITE FOR CATALOG

ARMSTRONG BROS. TOOL CO. "The Tool Holder People" 5257 W. ARMSTRONG AVENUE CHICAGO 30, ILL.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-118

Miniature Relay

Bantam-sized Class S relays are now available in a new small hermetically sealed enclosure. The entire unit measures $2\frac{1}{32}$ x $3\frac{1}{32}$ x $1\frac{1}{2}$ inches and weighs $1\frac{7}{8}$ ounces. Mounting studs may be arranged on base or narrow side of housing.



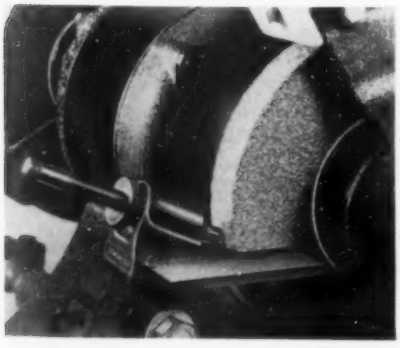
This miniature relay was designed for minimum inductance and maximum make-and-break speeds. It is tamper-proof and atmosphere-protected and meets or betters all provisions of MIL-R 6106. This relay in its new enclosure is recommended by the manufacturer for applications wherever extremes of shock, temperature and vibration require exceptional performance. Complete information is available by writing Automatic Electric Sales Corp., 1033 West Van Buren St., Chicago 7.

T-3-1191

Diamond Dresser

Simple construction, efficiency, versatility and low cost, are the features claimed for this diamond dresser. The manufacturers claim a perfectly trued wheel for accurate and fast tool sharpening, plus longer wheel life.

The Dymondcut dresser is designed



for use on pedestal, hand, carbide, surface, disk and toolroom grinders. It can be used also for either angle or side dressing. This dresser is recommended for wheels up to 10 inch diameter. Special applications are available for larger wheels. Write for technical information to Hazerodt Associates, 416 Ford Building, Detroit 26.

T-3-1192

A Crowning Achievement!

Photo courtesy of the Koebel Diamond Tool Co., Detroit, Mich.

by EASY-FLO NO. 3

The crown-like part you see above is a rock drill bit. The diamond-encrusted strips around the top, are brazed on with EASY-FLO NO. 3.

Think of the constant succession of terrific shocks and jolts these EASY-FLO NO. 3 joints have to take in drilling rock. You couldn't put brazed joints to a tougher test. Nor could you ask for more convincing proof of the great strength and ability to take punishment, of joints made with this member of the EASY-FLO family of low-temperature silver brazing alloys.

For the same reasons, EASY-FLO NO. 3 is widely used for mounting cemented carbide tips on cutting tools of all types.

BULLETINS 11-A AND 20 *will give you full details about the EASY-FLO alloys and their application, including the reasons for the exceptional strength and dependability, and the big time-labor-cost-savings inherent in brazing with these widely used alloys.*

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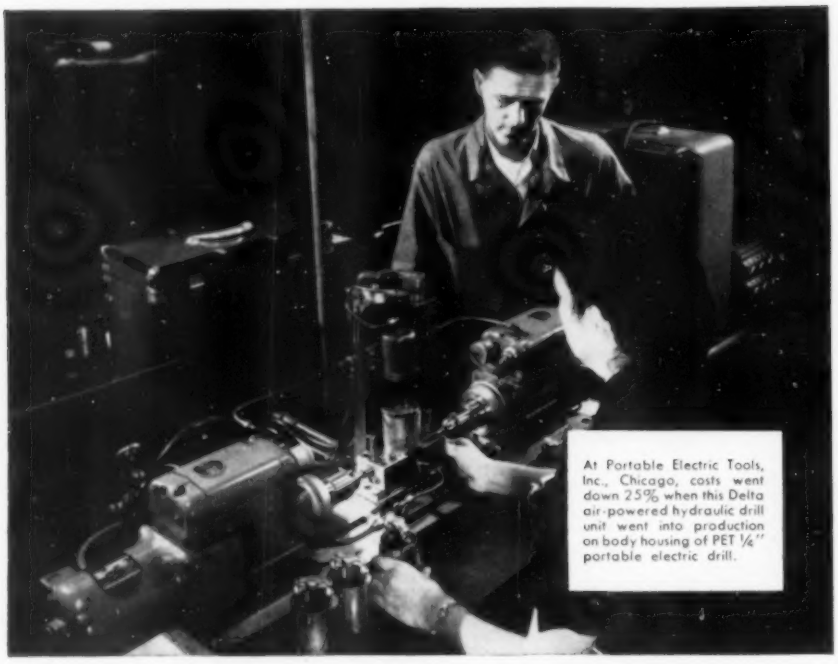
At Portable Electric Tools, Inc., Chicago, costs went down 25% when this Delta air-powered hydraulic drill unit went into production on body housing of PET ¼" portable electric drill.

Portable Electric Tools, Inc.

Cuts Production Costs 25% with DELTA Air Hydraulic DRILL UNITS

Portable Electric Tools, Inc., of Chicago combined two model 19-150 Delta Air-Powered Hydraulic Drill Units and a standard Delta drill press table to build a simplified, single-purpose production machine. Their aim was to increase unit production and cut operating costs.

The principal operation performed on this machine is the simultaneous boring of two brush holder holes in the PET "Super-Duty" ¼" portable drill body. Exacting accuracy is required because these holes are then used for locating the part for all other machining operations on the aluminum castings.

HERE ARE THE RESULTS:

"The Delta hydraulic drill unit has given us more than 25% production savings," says Walter Sundberg, Superintendent of Production Machining.

Tolerances held are plus .0005 and minus .0000.

Average output per hour, 150 bodies. No mechanical, service or maintenance problems, even when the machine has run three shifts for long periods.

Women workers with no previous experience operate the machine.

WHAT'S YOUR SPECIAL PROBLEM?

Delta air-powered hydraulic drill units can do for you what they've done for Portable Electric Tools, Inc. Your authorized Delta drill unit dealer will show you how to cut costs with this low-priced, high accuracy, high production drill unit. Our Catalog suggests many applications. Use the coupon.

DELTA MILWAUKEE

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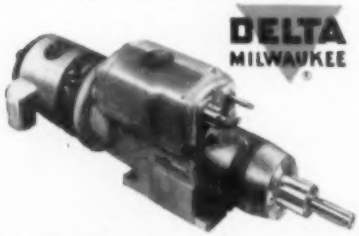

DELTA Quality Power Tools

Another Product of **Rockwell**

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ROCKWELL MANUFACTURING COMPANY
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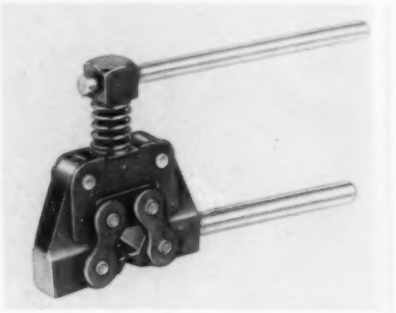
☐ Please send me catalog AD-723
☐ Send name of nearest authorized Delta drill unit dealer.

Name.....
Position.....
Company.....
Address.....
City.....Zone.....State.....

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-120

Chain Breaking Tool

This tool will disconnect any pitch roller chain manufactured according to the specifications of the American Chain Manufacturers Association from ¼-inch pitch up to and including 3-inch pitch. The jaws are of pearlitic



malleable iron, heat treated. The pressing tip is of case hardened tool steel and all other vital parts are heat treated. The Boston gear chain breaking tool is 5½ inches in length.

The roller link of the chain to be disconnected is inserted between the jaws of the tool. The adjustable lever is turned, forcing the pressing tip to push the pin through the pin link plate. The process is repeated on the pin at the other end of the same pin link plate, and the chain is then disconnected.

For additional information, write the Boston Gear Works, 14 Hayward St., Quincy 71, Mass. **T-3-1201**

Test Stand

An automatic, air and hydraulically actuated test stand for determining the physical characteristics of any seamed tubing up to three inches in diameter has been announced. Test specimens of steel, stainless steel and carbon steel tubing can be readily checked for flaring, column and crushing strength with pressures up to 100,000 lb.

The test stand is designed to assist quality control in the rapidly expanding production of electric-welded tubing used in the manufacture of boilers, furniture, power transformers of tubular type tank construction, heat exchangers for exhaust gas coolers, many automotive and industrial applications, plus other end products.

The test stand is self-contained, ruggedly built, has a hinged safety guard, and requires only a connection to 60-80 lb air supply. Operation is by solenoid, push-button control after the test specimen is inserted between fitting anvils.

Descriptive literature may be obtained by writing The Dommers Co., 428 South Cherry St., Wallingford, Conn. **T-3-1202**

Thread Wire Holder

This thread wire holder simplifies 3-wire method of measuring pitch diameter. The basic construction of the holder consists of two components, the stem holding the double wires and the thimble supporting the single wire.

Each stem, calibrated for only one American Standard pitch, has accurately milled slots to insure parallelism between the double thread wires. Threads per inch stamped on the stem identifies holder size.

The single thread wire is supported by a wire chuck which is an integral part of the coil spring mounted on a thimble. The coil spring's sidewise flexibility permits the single wire to assume the helix angle of the thread being measured. The spring also allows the spacing between the double and single wires to be set at a diameter less than the pitch diameter being measured. Measuring pressure of the micrometer will expand the spring to permit the single wire to assume parallelism with the two wires.

Measurements up to 6 inches can be made with the standard holder by remounting the stem and thimble on an extension bracket. For additional information write to Scully Machine Co., 62 Walter St., Bridgeport, Conn.

T-3-1211

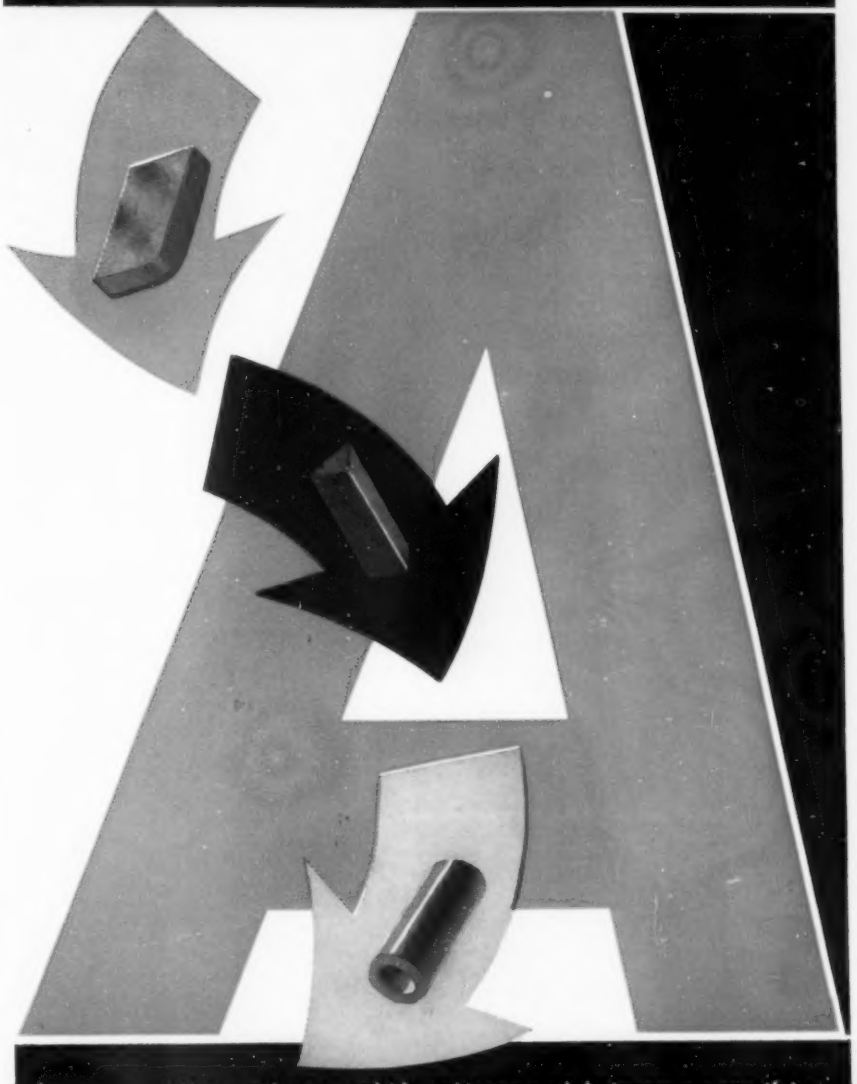
Greaseless Composition

The Hanson-Van Winkle-Munning Co. Matawan, N. J. announces a buffing and polishing composition known as Acme greaseless composition. The composition adheres strongly to the wheel face to form a heavy, fast-drying head which does not fly off and remains firm even in the warmest weather. There is no waiting for an application to set.

The composition also features a consistently sized abrasive. Particles of exactly the same size act upon all parts of the work to produce a uniform finish. Acme greaseless composition may be used on brushes and buffing wheels and for hand buffing. It gives excellent results in cutting, polishing, deburring or satin-finishing all metals. The composition is available in aluminum tubes and foil-lined cardboard cartons.

T-3-1212

FIRST WITH CARBIDE THAT LASTS!



More and more carbide engineers and designers are specifying ADAMAS for their tools, dies and wear parts because they know that Adamas Carbide grades are WORK-PROVED. High quality carbide from Adamas is JOB-ENGINEERED to fit both standard and special applications. Delivery is fastest in the industry. *Write for your ADAMAS catalog today.*

ADAMAS

TUNGSTEN CARBIDE

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FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-121

Steering Device

Air-O-Matic Power Steer Corp., 24 Noble Court, N.W., Cleveland 13, announces the marketing of their improved 1953 model Power Steer booster. The fully automatic steering device utilizes compressed air to supply power for steering on all commercial type vehicles.

The compact, self-contained, lightweight Power Steer booster is constructed mainly of anodized aluminum; is rust- and corrosion-resistant. Its durable construction resists the severe wear of constant day-by-day usage. It requires only a few fittings for easy, quick installation on old or new vehicles without altering or removing any part of the steering mechanism. One end of booster is fastened to a stationary member of the vehicle and the other end to a movable part of the steering linkage (Pitman arm, drag link, tie rod, etc.). Only one air line is needed. The device can't jam or freeze. Maintenance cost is low because there are no reservoirs to fill, no expensive pumps to replace, no fluid to leak away.

The Air Power Steer booster furnishes power to make extra-heavy steering easier and less tiring on tough excavating and material handling jobs. The operator of the vehicle can easily adjust the power steering assist to handle full load to no load, any condition of road, speed, sharp or gradual turns, or any combination of these variables. The accessory gives dependable trouble free performance in transporting capacity loads through deep mud, sand, snow, gravel; up steep hills and mountain grades. Air-O-Matic function with unfaltering, synchronized action provides easy vehicle steering in maneuvering through heavy traffic, loading or unloading at docks, in and out of parking places and narrow entries.

T-3-1221

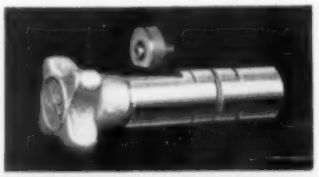
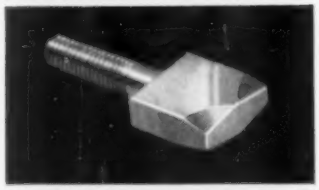
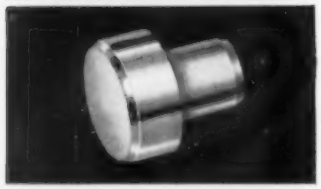
Stacking Truck

The telescopic tilting fork stacker in four base capacities of 1500, 2000, 2500 and 3000 lb, all rated at 24-inch center line of load, has been added to the line of Clark Industrial trucks.

Two standard models are offered in each capacity incorporating the Hi-Lo stack feature. One has an 83-inch overall height with 64 inches of free lift and 130 inches maximum lift. The other, especially designed for highway truck loading, has a 68-inch overall height with 49 inches free lift and a maximum lift of 100 inches.

These trucks are light in weight, yet compact in overall length and width, providing maximum utility for operation in minimum aisles and over low capacity floors. Lifting speeds vary from 21 to 14 feet per minute, depending upon load. Big truck performance is claimed for these compact, light weight trucks at minimum cost.

For information, write to the Clark Equipment Co. Powerworker Dept., Buchanan, Mich. **T-3-1222**

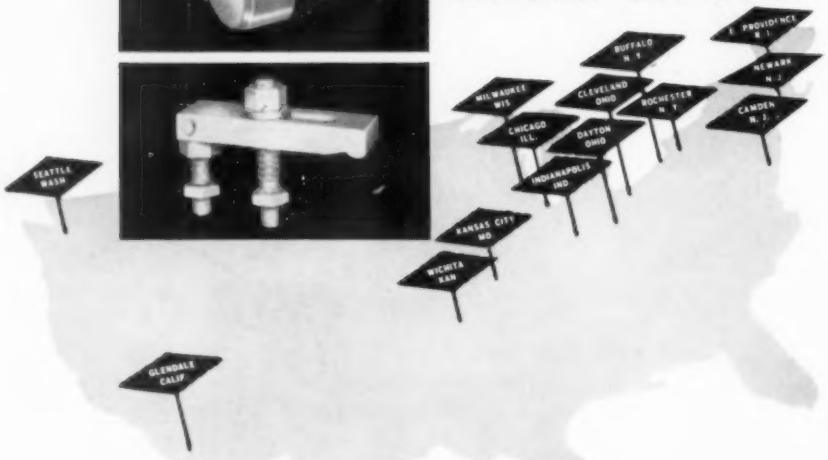




WESPO

Standard Clamps and Components

AVAILABLE IN STOCK

all over the U. S.



STOCKS AT FACTORY AND FOLLOWING:

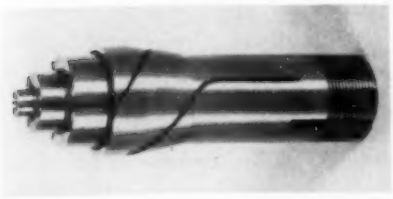
T. R. Goldsmith & Son, 33 Clyde Ave.—BUFFALO 15, N. Y.
Fidelity Tool Supply, 309 Vine St.—CAMDEN 2, N. J.
J. R. Reinertson & Co., 24 S. Crawford Ave.—CHICAGO 24, ILL.
T. E. Wardrope Agency, 10014 Euclid Ave.—CLEVELAND 6, OHIO
H. D. Geisler Co., 2715 Salem Ave.—DAYTON 6, OHIO
Mfgrs. Service Supply, 242 Taunton Ave.—E. PROVIDENCE, R. I.
Art Lewis Product Equipment Co., 422 Magnolia Ave.—GLENDALE 4, CALIF.
Standard Die Supply, 26 E. McCarty St.—INDIANAPOLIS 25, IND.
Ernst Machine, 1606 Oak St.—KANSAS CITY 8, MO.
Bell-Well Sales Co., 1323 N. Water St.—MILWAUKEE 2, WIS.
Columbia Eng. Co., 113-119 Sussex Ave., NEWARK, N. J.
Roessel & Co., 683 Hudson Ave., ROCHESTER 21, N.Y.
H. F. Soderling Co., 1745 4th Ave. South—SEATTLE 4, WASH.
Cummings & Co., 115 E. Lewis St.—WICHITA 2, KAN.

WEST POINT MFG. CO.
26935 W. 7 Mile Road, Detroit 19, Mich.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-122

Colletmandrel

The colletmandrel is a fast acting, accurate mandrel. It works wherever a collet works, in machines such as lathes, turret lathes, automatic screw machines, milling machines and collet fixtures, according to the maker. The colletmandrel must not be confused

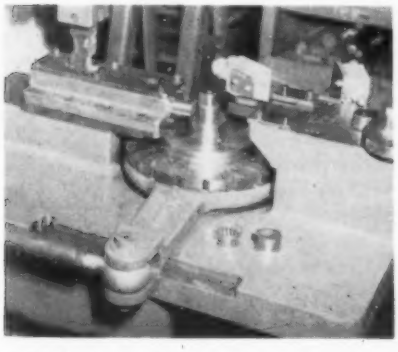


with a collet. The colletmandrel is designed primarily for second operational work. The mandrel portion of the colletmandrel expands when the colletmandrel is drawn into the head stock of the machine.

The mandrel portion of colletmandrels may be made in one or more diameters. Standard toolroom sets are sold in various combinations. Special colletmandrels are made to fit the buyers' needs. Made by The E. Westberg Corp., 800 Beley Ave., Syracuse 11, N. Y. **T-3-1231**

Power Press

Equipped with a special fixture, a power press has been built to pierce the cage of needle bearings. Operating at a speed of 100 strokes per minute, the machine pierces 19 rectangular holes, 7/64 inch wide by 5/8 inch long, in bronze tubing 0.025 inch thick.



As designed by the V & O Press Co., Div. of Emhart Mfg. Co., Hudson, N.Y., the press punches in a horizontal direction. The tubing blank is placed over a die where it is automatically pierced and indexed for the successive slots. When the required 19 piercings are completed the machine stops automatically. An 18-ton V & O press was adapted for the application. **T-3-1232**

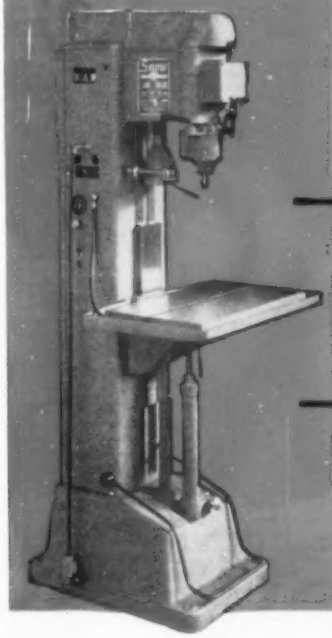
USE READER SERVICE CARD ON PAGE 133 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

Never Before

SO MANY ADVANTAGES for HIGHEST PRODUCTION

4800 PER HOUR!
3800 PER HOUR!
2500 PER HOUR!

For Top Production



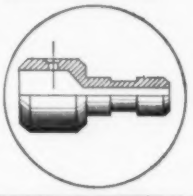
SNOW

FULL UNIVERSAL MACHINES

Air operated, electrically controlled Snow tools are establishing amazing production records daily on a wide variety of work. Just note these typical examples:

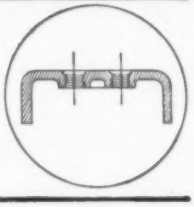
DRILLING

Crossdrill and C"T" Sink 1/16" Hole
Material—Brass
Production—4800 per hour
Fixture—#15 Vertical index
Equipment—#1-UD Drilling Machine



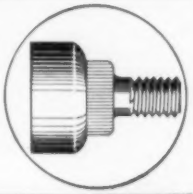
TAPPING

Tap Two #10-32 Holes
Material—Steel stamping
Production—3800 tapped holes per hour
Fixture—#14 horizontal index
Equipment—#1-UT tapping machine



THREADING

3/8"—24 Thread—1/2" Long
Material—Die Cast Aluminum
Production—2500 per hour
Fixture—#10 Drum dial
Equipment—#3-TR Threading machine



Snow air operated—electrically controlled machines have built in full universal controls that allow selection of the type of spindle cycle desired. This feature also permits instant synchronization of the standard Snow Master Fixtures. All types of air operated automatic and semi-automatic jigs and fixtures are carried in stock. Standardization permits low cost tooling—and—high production.

Sensitivity of power application prevents tool breakage.

Simplicity of control means that set up and operation can be handled by a less experienced operator with minimum fatigue.

SNOW

MANUFACTURING COMPANY

435 Eastern Ave., Bellwood, Illinois (Chicago Suburb)

Single Spindle Verticals • Two-Spindle Verticals • Two-Spindle Horizontals • Automatic Nut Tapping Machines • Drill Press Tap Heads • Automatic & Semi-Automatic Jigs & Fixtures

Submit Sample Parts for Production & Cost Estimates

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-123

Double-End Horizontal Hydraulic Press

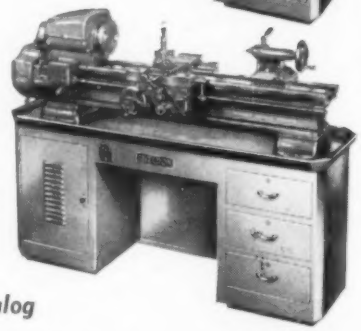
This double-end press permits production at both ends of a long stroke, thus eliminating the loss of time involved when the return stroke is not utilized. Since the double-end press replaces two items of equipment, the first cost is lower and the amount of floor space required is lower. It is also more adaptable for using conveyors for materials handling.

The press is of housing type construction with fully shrunk tie rods. It has a capacity of 330 tons at each end. Tonnage is variable from 0 to 330 tons.

The dimensions of the beds from front to back by right to left are 30 by 30 inches. The dimensions of the slides from front to back by left to right are the same. The maximum distance from the face of the beds to the slides is 54 inches, the minimum 18 inches. The maximum stroke of the slides is 36 inches.

The press is equipped with three pumps capable of supplying 77 gpm. Three motors, 75 hp, 1200 rpm, are required. The closing speed of the press is 2200 inches per minute, pressing speed, 200 inches per minute, and the return speed is 2200 inches per minute. The press weighs approximately 70,000 lb. **T-3-1241**

3 times the production capacity for the same tool investment



Old timers still tend to gauge a machine tool's productive capacity by its size and mass, and its accuracy by its cost. These old "rules" do not apply today, in the face of advanced machine tool engineering and modern machine tool building methods. For example, a modern TS56B Sheldon Precision Lathe, weighing around 1000 lbs., will handle the great bulk of production lathe work, and it has "Zero Precision" Timken Taper Roller Bearings—more accurate spindle bearings than found in 90% of the lathes of all sizes.

By scientific distribution of metal (rather than sheer mass) these new machine tools have rigidity and stamina not always obtained in more cumbersome machine tools. Lighter, handier and easier to run, they can be safely operated by the less experienced—by whatever operators available.

Produced in numbers, in a specially built and tooled plant, Sheldon Precision Machine Tools are low in price. Today for the cost of a single older type tool you can have 2, 3 or even 4 SHELDON units . . . can put 2, 3 or 4 operators to work . . . can double or triple your productive capacity for the same machine tool investment.

Let us show you how.

Write for Catalog

SHELDON
CHICAGO

SHELDON MACHINE CO., INC. 4229 N. Knox Avenue, Chicago 41, Illinois
FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-124

Auto-Collimator

A jackknife auto-collimator for the precise measurement of angles, parallelism and surface quality of metals, plastic, or glass, is now available from The Perkin-Elmer Corp., Norwalk, Conn. The auto-collimator can be used in routine machine and optical shop operations with an accuracy greater than 6 seconds or 0.002 degrees. No special operating skill is needed. The collimator is used directly against any surface which reflects a beam of light.

Among the uses of the collimator are: measuring the parallelism of two surfaces of transparent or opaque objects, angular measurements including prism angles, go no-go surface quality gaging, index for refraction and focal length measurements.

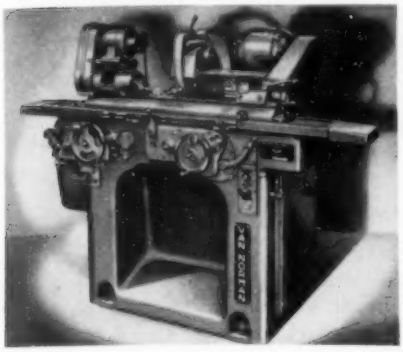
An important feature of the collimator is the folded optical path. This permits all components of the instrument to be housed in a single rugged casting. The worktable with its leveling controls is directly in front of the operator for easy manipulation while he is observing the image.

The optical characteristics of the jackknife collimator are the same as those of an 80-mm diameter telescope with a focal length of 960 mm and an aperture of f/12. The standard eyepiece has a focal length of 12 mm giving a magnification of 80X. Other eyepieces for reduced magnification and micrometric focusing are also available. **T-3-1242**

Cylindrical Grinder

The Van Norman Co., Springfield, Mass., announces the 418 grinder especially developed for fast precision traverse of plunge cylindrical grinding of small parts on a production basis.

The 418 grinder is adaptable for economical grinding of small parts in the toolroom and job shops where work usually is in small or medium runs.



The recessed design of the base permits the operator to sit comfortably at the machine, insuring maximum production throughout the day. All controls are conveniently grouped within easy reach from the operating position. Work pieces are easily loaded, ground and unloaded with minimum motion and effort.

Included among the many features of the grinder are: Pope wheel spindle; wheel slide rapid retraction and slide base well proportioned and constructed for rigidity and maximum accuracy; automatic starting and stopping of headstock and table traverse; semiautomatic lubrication; grinding wheel speeds of 1772 and 2067 rpm; headstock work speeds 153 to 940 rpm; maximum grinding diameter 4 inches; maximum distance between work centers 18 inches. Floor space required is only 43½ x 79¼ inches. **T-3-1251**

Tapping Lubricant

This blind hole tapping lubricant is extruded in solid stick form, similar to candles in shape. It is intended to assist in the tapping of threads in blind holes; holes which do not entirely pierce through the metal or plastic parts.

It is claimed that Hypertap eliminates tapping operations preliminary to bottoming by its automatic hydraulic removal of chips from the hole during the thread-cutting operation. It is contended that this stick lubricant permits the use of finishing or bottoming taps at the very start of the thread-cutting operation. This material is reported to facilitate the tapping of holes to within 1½ threads of the bottom, without the necessity of backing out of the hole to remove accumulated chips.

In application, a Hypertap stick, equal in diameter to the hole, is inserted prior to tapping. Next, the tap is brought down in the cutting action. In its descent through the hole, the tap exercises pressure on the lubricant, creating a hydraulic action which causes the Hypertap to envelop the resulting chips. This action forces the chip-laden lubricant up alongside the flutes of the tap and out of the blind hole. The benefits of this application are reported to be clean cut threads, longer tool life and substantially reduced tap breakage.

Hypertap is characterized as a non corrosive, water insoluble compound, incorporating in its body of solids a fine cutting oil which serves as a coolant in the tapping operation. It is stable in storage and will withstand temperatures below 100 degrees F. If subjected to greater temperatures, the material will soften, but can be stiffened quickly by immersion in cold water.

Sticks can be furnished in any specified diameter. Current Hypertap production is confined to diameters ranging between 9/64 and 1 inch. Standard lengths are 3½ and 7½ inches.

Write Destiny Products Co. Executive Offices, 2970 W. Grand Blvd., Detroit 2. **T-3-1252**

ADJUSTAFIX
A Name On Which To Rely
THE NEW
DOUBLE ECCENTRI
ADJUSTABLE
DRILL HEAD
Practically universal adjustment. 2 to 8 spindle, standard. Also specially designed heads.
Built for continuous use with full anti-friction bearing construction for high capacity thrust loads...precision-bored outboard spindle support plate.
UNITED STATES DRILL HEAD CO., CINCINNATI 4, OHIO
We manufacture all types of multiple spindle, fixed center and lead screw tapping heads
US HEADS
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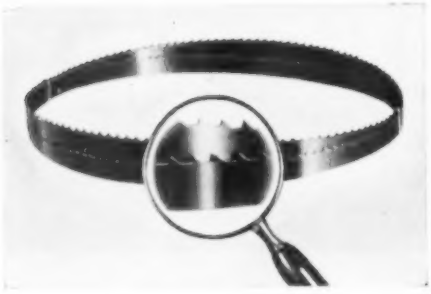
BARNES HACK SAWS — BAND SAWS BARNES

BARNES WELDED BAND SAWS ARE SUPERIOR!



LOOK AT THESE BARNES Features...

- Special equipment assures perfect welds.
- Controlled anneal provides flexibility and strength.
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- Prompt delivery from local Distributor's stock.

Welded bands are tailor-made for specific sawing machines. Saves operator time and eliminates waste blade material. Time saved increases production. Barnes assures a "perfect" weld on a superior blade. It all adds up to more cuts at less cost.

Barnes Band Saws are available 3 ways: Welded Bands, Arc Line 100-foot Coils, Random Economy Coils.

BARNES

Call YOUR INDUSTRIAL DISTRIBUTOR

W. O. BARNES CO., INC.
1288 TERMINAL AVE., DETROIT 12, MICH.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-126

Cold Type Degreaser

Graymills Agitene, an improved parts cleaning solvent for metal parts, now contains Tergene, a detergent compound, for faster cleaning action. It is used in various types of parts washing equipment and for cold dip tanks.

Agitene with Tergene parts cleaning fluid is listed by Underwriters' Laboratories, having a flash point of 110 degrees, it is safe to use for many types of parts cleaning. Agitene is nontoxic; will not harm any metal; does not require a water rinse. It is used for removing cutting oils, lubricants, grease and sludge. Manufactured by Graymills Corp., 3729 N. Lincoln Ave., Chicago 13. **T-3-1261**

Pneumatic Drill

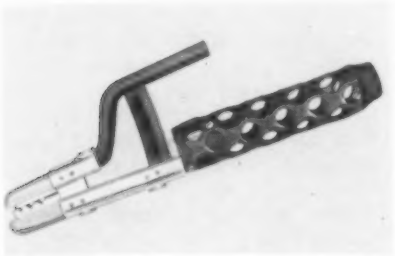
Specifically constructed for heavy-duty operations with maximum power on continuous runs, the Mall PD-304P pneumatic drill is lightweight and compact in design. The contoured pistol grip, trigger throttle and built-in

speed regulator combine for easy efficient handling. This heavy-duty drill has its own built-in oiler and all moving parts glide on precision ball bearings. The PD-304P measures 6 13/32 inches in length, 2 1/16 inches in width, 6 1/2 inches in height and weighs only three pounds. This drill comes with a 1/4 inch Jacobs chuck, key, wrench, hydraulic fitting, 1/4 by 8-inch air hose and lubricant.

Write Mall Tool Company, 7725 South Chicago Ave., Chicago 19, for further details. **T-3-1262**

Electrode Holder

A 400-ampere insulated electrode holder, the Cooltong, has been announced by The Lincoln Electric Co. Cleveland 17, Ohio. The holder has several patented features which field tests have proved to give longer service life and cooler operation than is normal with holders of similar capacity. It is claimed that in one test made with the holder, it remained cool enough to weld with bare hands when using 400 amperes current.



The nose is a special sandwich construction consisting of a copper core between four and six layers of laminated, glass-impregnated, plastic cloth. This patented construction gives longer service life because the copper core, in addition to being reinforcement, dissipates heat so that it will not concentrate in the nose, causing deterioration in the insulation.

The jaws, covered by this insulating construction, are made of tough, highly conductive, Mallory 3 metal, non spatter type. They will handle electrodes from 1/8 to 5/16 inch in size and have a wide opening to permit fast release of stubs.

Current carrying frame parts are made of pure copper for high conductivity. These parts are reinforced with steel to increase the rigidity and strength of the frame. Frame insulation is covered with a copper sheathing to protect insulating part from heat and spatter and to keep the holder cooler by carrying away heat. The holder handle is perforated with large holes to provide superventilation and reduce heating from induced currents when welding with ac. The handle is unbreakable and is easy to hold in any position. **T-3-1271**

Plating Barrel

The Hanson-Van Winkle-Munning Co., Matawan, N.J., announces new submerged barrel plating equipment which completely immerses the plating barrel in the electrolyte. All surfaces of the work receive a uniform solution bath because no part of it can be exposed to the air while tumbling. This results in a consistent, all over even finish. The completely submerged barrel also permits greater current density and thus enables faster plating.

The equipment includes both barrel and plating tank. The barrel is hexagonal in shape and has an inside diameter of 14 inches. Barrels are available in 30 and 36 inch lengths, having approximate capacities of 125 and 150 lb respectively.

Plexiglas barrels are recommended for all-around use in solutions up to 180 degrees F. Melamine is recommended for use in solutions up to 210 degrees F. Plexiglas barrels have 1-inch thick heads and 1/2-inch panels; Melamine barrels have 1-inch thick heads and 1/4-inch panels with rib reinforcement.

The barrel is suspended in the plating solution on hanger arms which form an integral part of an angle-iron frame which transverses the top of the tank. Frame contact pins fit into tank saddle brackets and provide electrical contact between bus bars (on which saddles are mounted) and barrel heads (equipped with flexible dangler contacts).

Tanks are constructed of 1/4-inch double electric-welded steel. The drive motor, including speed reducer, is mounted on a shelf at one end of the tank. Tanks are painted with rust-protective gray enamel and trimmed with black. Each tank has a 2-inch drain at the bottom and has space for mounting two heating or cooling coils. Special vulcanized-rubber or koroseal-lined tanks are available for use with acid solutions. Cast iron hanger arms and gears can be supplied for cyanide solutions. Rubber-covered cast iron hanger arms and plastic gears can be ordered for acid immersion. **T-3-1272**

"DETROIT" means...

FACTORY-ASSEMBLED
FACTORY-INSPECTED
DIE SETS

with "DETROIT"
you save mounting costs,
increase production runs

First: "Detroit" craftsmen, working with finest precision equipment, take pride in the superior quality of every "Detroit" Die Set. *Second:* Every set is fully assembled and inspected at the factory. Here are complete inspection facilities and testing skill that mean each "Detroit" Die Set is right before it is shipped.

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DETROIT DIE SET ★

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-127

Measuring

With the introduction of four new models, a complete line of frequency counting equipment is available from the Potter Instrument Co., Inc., of Great Neck, N. Y.

These instruments fall into two broad classifications and have been designed to satisfy distinctly varying requirements. The simplified frequency counter models 820 and 830 are intended for rapid and accurate production test measurements. The universal frequency-time counter models 840 and 850, on the other hand, incorporate all the flexible circuitry necessary to perform any known function in counting, timing or frequency-measurement.

As compared with earlier versions, the new models are reduced in size and weight. Panel layout has been planned for ease and convenience in operation. A choice between two types of panel

indication is provided: either the exclusive Potter 1-2-4-8 decimal readout for dependability or the conventional ten lamp 0-9 readout, if desired. A special bracket kit, used for rack mounting, permits access to the counter on slides.

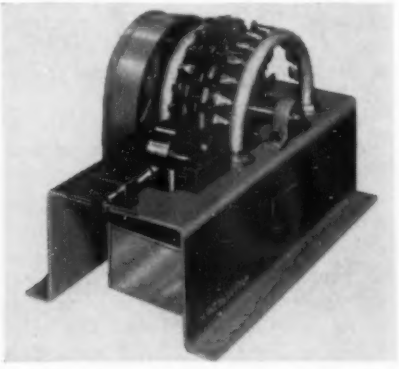
For speed, accuracy and simplicity, the model 820 and 830 frequency counters suit the production line and are useful for calibrating oscillators, for measurement of flow and pressure with appropriate pickup devices and for obtaining rpm data on engine test stands, among other applications.

Greater versatility is featured in the model 840 and 850 frequency-time counters which contain all the timing, gating and switching facility necessary for the widest possible range of measurement functions. These include direct counting of frequencies up to one megacycle or timing the period of a cycle within ten microseconds. Elapsed time is measurable in increments variable from ten microseconds up to one second. Two unknown frequencies can be compared to obtain a ratio or an external standard introduced for a higher accuracy time base. For use as a secondary frequency standard outputs are provided from a frequency divider at 100 kc, 10 kc, 1 kc, 100 cps, 10 cps and 1 cps.

More detailed information will be provided on request by the Potter Instrument Co., Inc., 115 Cutter Mill Rd., Great Neck, N. Y. **T-3-1281**

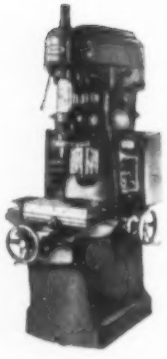
Heat Checking Tester

Thermo-Test determines the relative resistance of different materials to heat checking. Test pieces are successively heated, stressed and cooled. This cycle of heating, stressing and cooling is repeated until the specimen develops visible cracks or heat checks.



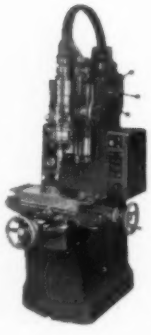
The number of cycles required to produce heat checks are indicated on a counter attached to the machine. As many as eighteen test pieces can be tested at one time. The effects of various heat treatments, the range of heating and cooling, amount of pressure applied to the specimen and the effects of various alloying elements on the resistance of steel to heat checking can be studied. Various materials used for molds, permanent molds, die casting dies, glass molding dies, drop forging dies, hot piercing mandrels, extrusion dies, hot rolls, etc. can be tested. The Thermo-Test is manufactured under U.S. Patent No. 2611264 by Henry G. Conn. **T-3-1282**

NOW IS THE TIME TO PLAN AHEAD



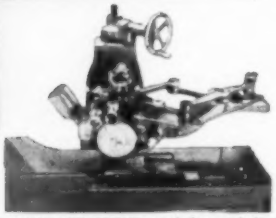
No. 2 MOORE JIG BORER, with its accurate lead screw settings within .0001", offers all the time-proven precision features associated with Moore Jig Borer construction for 15 years, plus numerous labor-saving advantages, including: increased capacity and size; infinitely variable spindle speeds; 3 power feed ratios; centralized controls.

No. 2 MOORE JIG GRINDER. With this new and larger Moore Jig Grinder, *regular and irregular contours* are ground to size and location after hardening. This extends the Jig Grinder's traditional function of relocating straight and tapered holes. Holes from 1/64" to 8" can be relocated and ground within .0001"—by power or hand feed.



Four ways to cut costs and meet competition by mechanizing your toolroom.

No. 1 MOORE JIG BORER remains in the line. For its range—table working surface of 10" by 16" and cuts up to 3½"—this machine is still an ideal buy. There are over 2000 satisfied users. We will continue to offer it for the many situations where a small, accurate jig borer fills the required prescription.



MOORE PANTO-CRUSH WHEEL DRESSER speeds form-grinding and cuts costs. Both crush-forming and diamond-dressing are accomplished with this 2-in-1 unit permanently mounted on the wheel spindle of a surface grinder. You switch from one method to the other without disturbing workpiece setting.

We'll be glad to send you complete descriptive literature on any of these machines.

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732 Union Ave., Bridgeport 7, Conn.

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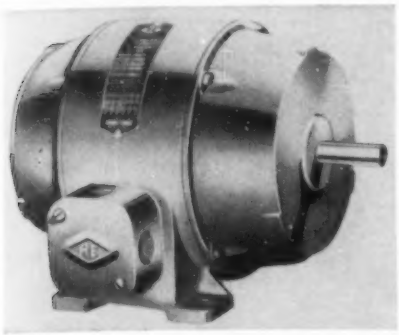
Multi-Speed Motors

Great power versatility is provided for in Reuland multi-speed motors, since a single unit can be operated at different speeds to fit the needs of special jobs. All multi-speed motors are now available in 2, 3 or 4 speeds in



either constant torque, variable torque or constant horsepower types (2-speed motors are supplied with either 1 or 2 windings—3 and 4-speed motors with 2 windings only). Motor sizes range from ½ to 150 hp. The motors can be furnished in either standard, totally enclosed, splash-proof or explosion-proof designs. They are also available as Motoreducers and with magnetic brakes.

Write for engineering folder No. MS-1000 to Reuland Electric Co., Alhambra, Calif. **T-3-1291**

Electric Timer

The Bristol Motor Div. of Vocaline Co. of America, Inc., 67 Coulter St., Old Saybrook, Conn., has developed an electric timer with an extra high rating 1650 watts, for use as an automatic time-control attachment for tumbling machines, small baking ovens, air con-

ditioning and humidifiers, or for controlling the break-in period for motors, electronics equipment, etc.

The unit called Two-Timer model 2T-20 can be preset to turn on or off a properly rated device plugged into it at any time up to 20 full hours, or fraction thereof, ahead.

The timer is designed for use with 105-120 volt, 50-60 cycle current, rated load 15 amperes at 110 volts.

Powered by the model 200 Bristol Circle B synchronous timing motor, the complete unit weighs 1 lb and measures 2x2x4 inches. **T-3-1292**

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Your non-standard parts can be manufactured *complete* (above) . . . or pre-formed by forging, ready for further shaping and machining in your plant (below). Made by the Kaufman *Double Extrusion* Process, your design is produced with accuracy in dimensional detail—is *stronger* through forging by our process.
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originators of the Kaufman DOUBLE EXTRUSION Process
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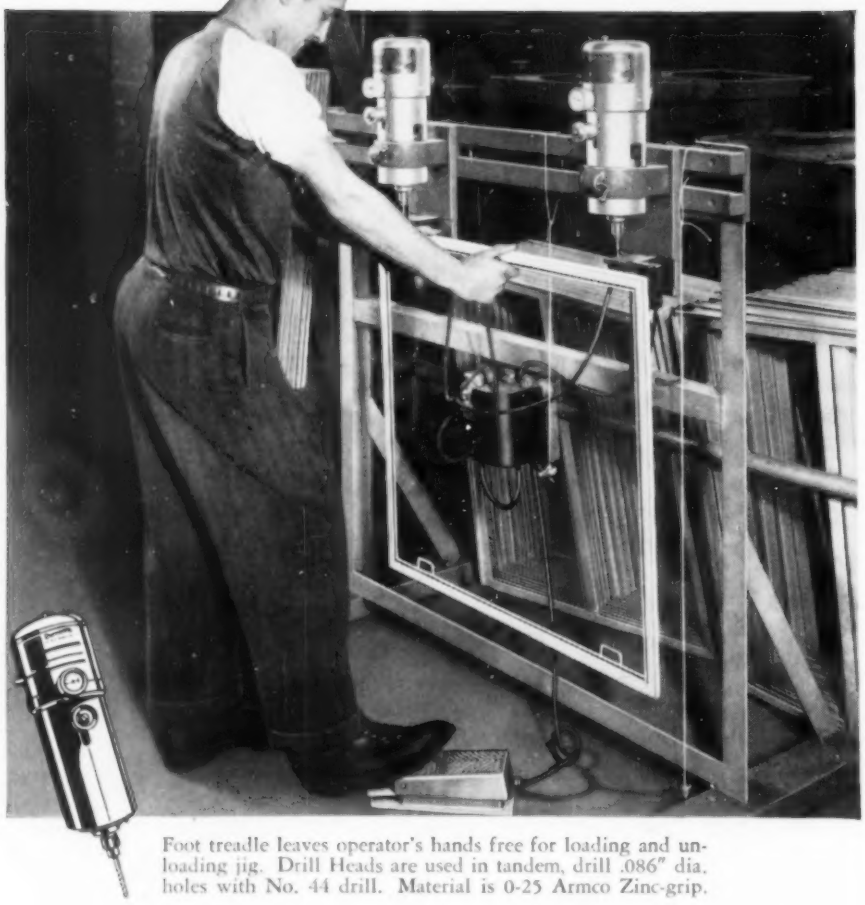
DUMORE DRILL HEADS

cut small hole drilling cost 75%

..multiply production 4 times!



Foot treadle leaves operator's hands free for loading and unloading jig. Drill Heads are used in tandem, drill .086" dia. holes with No. 44 drill. Material is 0-25 Armco Zinc-grip.

Metal window manufacturer drills 600,000 holes yearly with these amazing tools!

THE world's largest manufacturer of all-metal combination screen and storm sash installed 2 Dumore Automatic Drill Heads . . . got these almost incredible results. (1) 600,000 instead of 150,000 holes drilled per 2000-hr. shift-year. (2) Cost per 1000 holes decreased from $23.00 to $5.60. (3) Drill breakage reduced to the point where savings paid for the Drill Heads in 13 months.

And the most amazing thing about this report is that it is not an isolated case. In fact, increased output and similar savings on costs of production, scrap loss, and reductions in down-time, are being effected in practically every instance where Dumore Automatic Drill Heads have been installed. As this manufacturer says, "They are a 'natural' for multiple drilling operations."

To get an idea of how these amazing tools can help you improve your production and cut your costs, see your industrial distributor, or write:

THE DUMORE COMPANY

1325 Seventeenth Street • Racine, Wisconsin

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-130

Gear Hobbing Machines

A line of gear hobbing machines, manufactured by David Brown Machine Tools, Ltd., England, is available in sizes from 15 to 240 inches and includes universal gear hobbers, pinion

hobbing machines, gear shaving machines, spline hobbing machines, production hobbing equipment and relieving lathes. The accompanying photograph shows a 15-inch gear hobber, the smallest size, on the table of a 240-inch machine, believed to be the world's largest. Distributed in the U.S. by Morey Machinery Co., Inc., 410 Broome St., New York 13. **T-3-1301**

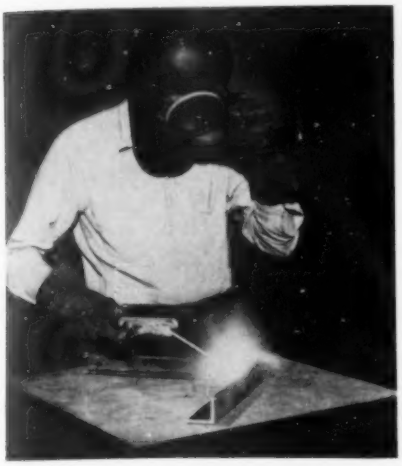
Gage Cabinets

Two mahogany cabinets are now available into which any of gage sets made by Size Control Co., Div. American Gage & Machine Co., 2500 W. Washington Blvd., Chicago 12, will fit. Space is provided in each cabinet for separate collets to fit a Universal handle for each plug member in class XX, X, Y and Z accuracies.

There are reversible plain sets in number, fractional or letter sizes complete in cases, reversible thread sets in any combination of reversible standard thread sizes, national and unified series, reversible special sets in any combination desired. These sets are suitable for experimental laboratories and are also widely used in precision job shops. **T-3-1302**

Welder's Helmet

An all-shade welder's helmet is introduced under the name Vari-Shade, manufactured by Polacoat Inc., 9764 Conklin Rd., Blue Ash, Ohio.



Designed to fit all standard welders' helmets, the unit gives complete protection in shades from 6 to 12. This unit eliminates the necessity of changing lenses when changing from one type work to another. It is particularly fine for starting and welding on close work. After the arc is struck, a flick of the hand turns the attachment to higher intensity.

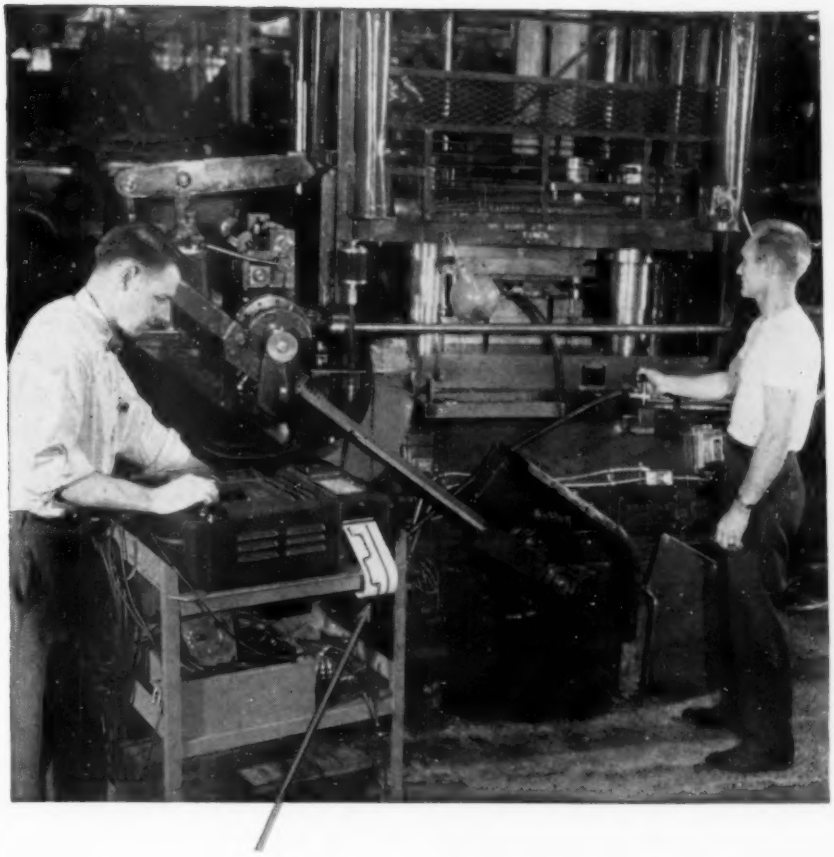
The Cari-Shade helmet attachment is furnished with a 1,000-hour cover lens for the further convenience of the user. **T-3-1311**

Hard-Facing Alloy

Resistance to abrasion at high temperatures, the ability to withstand attack by molten copper and improved welding characteristics are some of the advantages offered by CM-119, a hard-facing alloy manufactured by Coast Metals, Inc., Little Ferry, N.J.

Because of its ability to resist abrasion at the temperature of hot-rolled steel, CM-119 has already found successful application as hard facing for large guide rolls and as hot friction guides and soaking tong btis. And its resistance to attack by molten copper permits CM-119 to yield excellent resutls as protection for the lips of copper converters.

The alloy can be applied with any good arc-welding process. It has easy characteristics that assure efficient bonding. It will weld over itself and more ferrous materials without cracking, checking or porosity, a fact which permits patching where previously full replacement has been necessary. This and the longer service life that result from abrasion resistance make CM-119 economical both for initial hard facing and subsequent rebuilding. **T-3-1312**



CHECKS PRESS LOADING

with Brush Recording Analyzer

Here, in the plant of a large manufacturer of automotive parts, periodic checks are made on this 150-ton mechanical press to spot possible overloading. With resistance-type strain gages mounted on the press, the signal is amplified and recorded by the Brush Strain Analyzer... producing an *immediate chart record* of press strain.

Since measurements can be made quickly and easily, the Brush Strain Analyzer furnishes a *practical method* of detecting overloading and avoiding costly breakdowns, and lengthening press life.

You can use Brush Recording Analyzers to save time and solve problems... in measurement of strain, torque, vibration, pressure, d-c or a-c voltages or currents, and other variables. Brush representatives are located throughout the United States. In Canada: A. C. Wickman, Limited, Toronto. For bulletin write Brush Electronics Company, Dept. BB-3, 3405 Perkins Avenue, Cleveland 14, Ohio.

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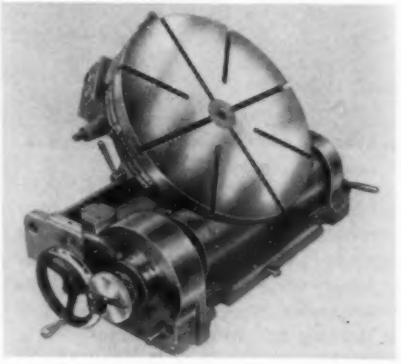
Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-132

Tilting Rotary Table

A 24-inch diameter tilting rotary table has been added to the line of rotary tables made by Pratt & Whitney Division Niles-Bement-Pond Co. West Hartford 1, Conn. A high degree of accuracy together with power rotation makes this table extremely versatile.

Power rotation is provided by a three-phase ½-hp shell-type motor that has been built into the table pivot. Motor design and location are such that mechanical shocks are minimized. The table can be rotated through 360 degrees in either direction in any plane of arc, by the use of convenient push-button controls. For fine adjustments



the table is rotated by the use of a hand-wheel with a self-centering spinner knob. Table graduations in degrees are read directly off the table, while minutes are read on the table rotary wheel dial. A vernier used in conjunction with the rotary wheel dial brings readings down to two-second intervals. A sliding pointer on the side of the table bed can be set at zero anywhere along a 45-degree arc.

The rotary table can be tilted from 0 through 90 degrees. A rapid elevating handwheel is provided for fast positioning. Table arc settings are made in degrees using a graduated quadrant on the face of the table pivot. A vernier on this scale subdivides to one minute. For more accurate positioning of the table arc the sine bar method is used. This method involves setting up a simple triangulation problem and using the desired angle to solve for the unknown height of the triangle. Precision gage blocks equal to this height are then placed on the ground and lapped platform and the table lowered until the measuring pin on the table bed touches the top of the gage blocks. Accuracy in seconds up to 45-degree elevation can be accomplished in this manner.

The table is equipped with simple, positive lever binders thus eliminating the need of wrenches. Another feature is the tapered elevating worm gear which provides adjustments to take up on the backlash. **T-3-1321**

THE TOOL ENGINEER'S *Service Bureau*

TRADE LITERATURE CURRENTLY OFFERED BY THE TOOL ENGINEER ADVERTISERS

LITERATURE NUMBER	COMPANY	BULLETIN	DESCRIPTION
A-3-292	Allegheny Ludlum Steel Corp.		36-page booklet, "Cutting Tool Materials," contains invaluable data for production men.
A-3-228	American Broach & Machine Co.	450	Photographs, drawings, charts and case histories of broaching tools contained in free catalog.
A-3-209	American Drill Bushing Co.		New catalog simplifies selecting and ordering—contains handy reference charts, pricing and technical data.
A-3-182	B. C. Ames Co.	58	Your job requirements met with line of Ames Top Quality Measuring Instruments. Free catalog.
A-3-227	Behr-Manning Corp.		"Blueprints for Production" gives case histories that show new ways in which Behr-Manning coated abrasives are cutting production costs.
A-3-298	The Bellows Co.		Bellows Air Motors speed production and cut costs. New, free, 36-page booklet filled with valuable data.
A-3-301	British Industries Corp.		Versatile Kitchen & Wade Radial Drills' advanced features, sensitivity, and low initial price make them desirable in producing quality work at low cost.
A-3-207	Cadillac Stamp Co.	M-120 SE-130	Cadillac Marking Devices designed for all marking needs from simple hand stamps to complicated marking machinery.
A-3-291	Carboloy, Department of General Electric	D-124	Carboloy Die Engineering Manual gives complete story of how Carboloy dies and service offer greater production with less down-time and maintenance.
A-3-279	Carborundum Co.		Free copy of Coated Abrasive Selector Catalog contains detailed recommendations for both machine and hand-sanding operations on various materials.
A-3-167	Cleveland Tapping Machine Co.	TL-34	More perfect pieces per hour with Model E-2 horizontal. Catalog "Production Tapping Guides" tells how to speed production.
A-3-310-1	Comtor Co.	46	Bulletin describing advantages and uses of Comtorping for high-precision gaging.
A-3-288	Crane Packing Co.		Two illustrated booklets give full facts on Lapmaster production lapping, and how to produce and measure precision flatness and finish.
A-3-297	Cushman Chuck Co.	PO-64TE	Conserve manpower with Cushman air chuck equipment. Catalog covers complete line of air chucks, air cylinders, and accessories.
A-3-310-2	Diamond Tool Research Co., Inc.		Thirty-two page catalog describing complete line of diamond wheels.
A-3-31	The-DoAll Co.		New, recirculating "Cool-Grinding" system for tool-room and production work. Manual and hydraulic operation.
A-3-226	Eastern Machine Screw Corp.		H & G Chaser Die Heads—more economical for threading—less trouble, fewer rejects, less down time.
A-3-190	Erickson Tool Co.		Catalogs offer ways to offset machine errors, to increase production, reduce scrap, and lower tooling costs.
A-3-261-1	Eutectic Welding Alloys Corp.		Tool and die salvage welding manual filled with ideas for financial saving and tool and die salvage procedures.
A-3-171	Fray Machine Tool Co.	4 10	Work moves faster, cost less with a Fray No. 10-VR milling machine. Rugged—easy to operate.
A-3-21	Gisholt Machine Co.		Need faster and greater production? Look into the Fastermatics. Designed for accurate, economical high production.
A-3-308	Gisholt Machine Co.		"Wear and Surface Finish" booklet available describing superfinishing.
A-3-112	Hammond Machinery Builders, Inc.	235	Speed, economy, accuracy in your grinding with Model VC Style M Motorized Solid Carbide Insert Grinding Fixture.
A-3-119	Handy & Harman	11-A 20	A Crowning Achievement by Easy-Flo No. 3! Exceptional strength and dependability, time, labor, and cost savings.
A-3-314	Hanna Engineering Works	255	New bulletin showing Hanna cylinder power in action.
A-3-221	Hannifin Corp.	110, 111 112	Hydraulic cylinders especially designed to meet the needs of machine tool builders.
A-3-300-1	Hapman Conveyors, Inc.	TE353	Hapman Tubular Conveyors cut costs. Bulletin offers details.

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A-3-262	Haynes Stellite Co., Division Union Carbide and Carbon Corp.		New Manual "Haynes Stellite Metal-Cutting Tools" gives information on how to increase pieces per grind.
A-3-284	Henry & Wright, Division Emhart Mfg. Co.		"A profit with every stroke." New catalog gives up-to-the-minute facts on dieing machines.
A-3-138	The Hisey-Wolf Machine Co.	72EE	Hisey Grinder line unusually complete—wide range of sizes and types for various sharpening, snagging, finishing and fitting operations.
A-3-163	The B. Jahn Mfg. Co.		"The Story of B. Jahn Production Proved Dies" brochure illustrates and explains B. Jahn's production—increasing, money-saving applications.
A-3-266-3	J. G. Jergens Co.	TE-3	Absolute seal against coolant, grit and dust when using Jergen's pilot bearing bushing.
A-3-114	Keller Tool Co.		Free copy offered of "The HOLE Story of the Keller Air-feedrill." Outperforms advance estimates.
A-3-34	Kling Brothers Engineering Works	3345	Two shears in one machine. Gives more cuts per day on flats, angles, rounds.
A-3-10	The Lapointe Machine Tool Co.	HP-40-5	Machine easy to load and unload, and economical to operate. Practically automatic.
A-3-135	Lavallee & Ide, Inc.		Brand new L & I reamer catalog offered.
A-3-142	Modern Industrial Engineering Co.	103-50	Model 2029 Burr-Masters chamfer and burr up to 20 teeth per second.
A-3-302	Morey Machinery Co.		Morey "Machine Tools and Accessories" complete machine tool catalog now available upon request.
A-3-317-3	Morton Machine Works		Quality and service. 72-page catalog points out savings in tool and design costs.
A-3-283	National Acme Co.	DT-52	Namco—Micrometer takes the guess-work out of chaser grinding. Saves time—reduces costs.
A-3-323-2	New Hermes, Inc.	H-63 IM-63	Engravograph for heavy production in engraving—profiling. Tracer-guided for unskilled labor.
A-3-309	Oakite Products, Inc.		Oakite compound No. 33 removes oil and rust in one operation. More information about Oakite methods in free copy of bulletin.
A-3-233	The Ohio Crankshaft Co.		Free copy of "Typical Results of Tocco Induction Brazing and Soldering." Offers time and money-saving hints.
A-3-213	The OK Tool Co., Inc.	13	Make two, three, or more cuts with one pass of the tool. Latest edition of catalog "Modern Milling Cutters for Modern Milling Machines" available.
A-3-293	Ortman-Miller Machine Co.		Interchangeable mounts make O-M cylinders adaptable to any installation without disassembling or changing the cylinder.
A-3-238-4	J. A. Richards Co.	TE-5	Multiform Model BBB saves die costs; saves on expensive presses. Designed for fabricating without special tooling.
A-3-245	Rivett Lathe & Grinder, Inc.		5 books packed with important and necessary data required to lay out succsful air and hydraulic circuits.
A-3-249	The Rotor Tool Co.		Special bulletins on specific tools. "Tops in precision."
A-3-4	Standard Gage Company, Inc.	C	Standard Gages help you do the job better, easier.
A-3-150	Stocker & Yale, Inc.		Brand new Optical Comparator brochure outlining ten optical gaging problems and a brief basic instruction course in optical projection methods.
A-3-29	Sundstrand Machine Tool Co.	729	Greater horsepower, faster setup, wider feed range and other advantages described in bulletin.
A-3-363	Turchan Follower Machine Co.		"Turn to Turchan to Cut Cost." New catalog tells how to get more and better work from your present machines without skilled help and special tools.
A-3-254-1	U. S. Hoffman Machinery Corp.	A-690	High flow rate, self-cleaning dry sludge—all a result of "Vac-u-matic."
A-3-313	Waldes Kohinoor, Inc.		Fast, economical, needs no skilled labor for precision cutting of internal grooves in bores and housings.
A-3-166	Wendt Sonis	53	New illustrated catalog containing complete details and specifications for standard carbide tools.

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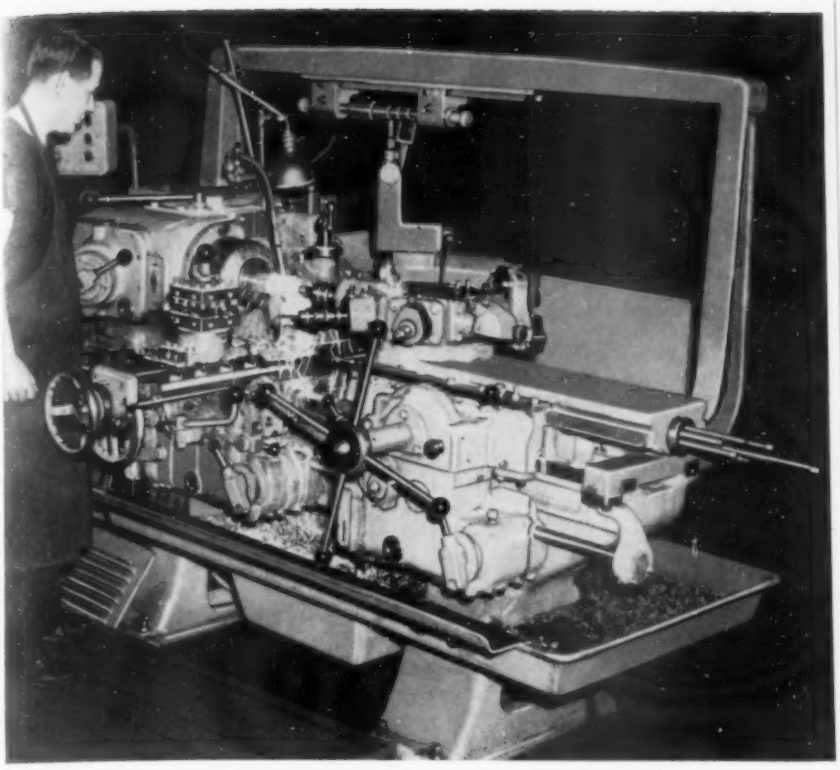


Tracing Attachment

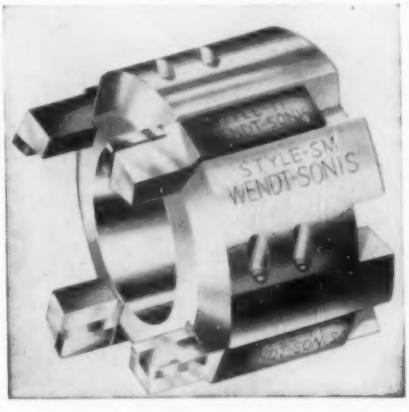
Jones & Lamson Machine Co., 518 Clinton St., Springfield, Vt., has announced a completely new turret lathe hydraulic tracing attachment. It is designed for exclusive use on any J&L ram or 7A saddle universal bar or chucking machine for general tracing, multi-step shaft, and contour work. This attachment is powered by a differential type cylinder. The tool-carrying slide is mounted on a 45-degree angle with the spindle axis. The cylinder stylus, and cutting tool are mounted on the back of the cross slide on a bridge type carriage, thus freeing the square turret for other operations on the same piece. It fills the need for a machine which goes beyond the performance of an ordinary turret lathe, yet requires less setup time, which makes it admirable for small-lot runs on multiple diameter and contour work.

This tracing attachment is also an excellent device for turning tapers. A hardened straight edge, set at the desired angle, serves as a template or former. In addition to the actual tracing and taper-turning functions, this attachment makes available all of the known facilities of a turret lathe, in effect, on a profiling lathe. Thus, fast hogging of stock, threading, or any other turret lathe operation can be accomplished without removing the piece.

The tracing mechanism can be disengaged simply by turning a switch. The whole attachment can be installed in the field. **T-3-1351**

Shell Mill

Smoother finishes and more precise tolerances are now possible with the standard inserted blade shell mills manufactured by Wendt-Sonis Co., Hannibal, Mo. According to company engineers, these carbide-tipped shell mills will cut production time and reduce tool cost on nearly every application.



All blade slots of these cutters are finish ground to precision tolerances to assure minimum tooling time and maximum operation time.

All carbide cutting edges are diamond lapped. Blades can easily be removed for free hand grinding to a template or precision ground in the cutter body. Two styles of blades are available for steel, nonferrous and cast iron milling. Sizes range from 3 to 6 inches and are available in 4 and 6-blade styles. **T-3-1352**

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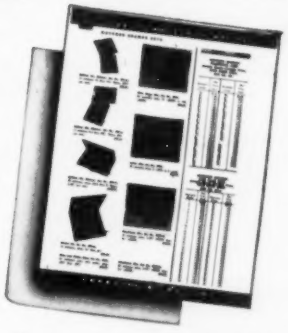

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LAVALLEE & IDE, INC.

CHICOPEE, MASS.

INDICATE A-3-135

Vacuum Switch

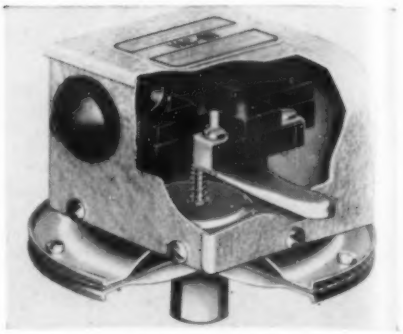
An inexpensive vacuum switch that shuts off the power source when liquid supply runs dry has been announced by Jaycon Associates, 404 North Washington Ave., Minneapolis, Minn.

Designed for use with electric motors and gasoline engines, the switch has many industrial, marine and manufacturing applications as a circuit-breaker or control where the safety of equipment depends on a suction-delivered lubricant, fuel, water or similar liquid.

The switch also serves as a warning control where operating conditions depend on a vacuum: vacuum firing in ceramics manufacture, or the protection of materials in a vacuum are cited as examples by the manufacturer.

The switch mounts on the suction line and is wired into the power supply on electric motors, or the spark system on gasoline engines. When suction falls below a predetermined negative pressure, approximately 1 inch of mercury, the switch automatically cuts off the motor or gas engine.

Operating on a spring-loaded, rubber diaphragm principle, the vacuum



switch utilizes silver contact points for heavy-duty service. The model for motor use will operate on electric motors up to two hp on ac and ½ hp on dc. The gas engine model is designed to short out the spark plug in event of liquid supply failure.

A hand lever is incorporated on the switch for manual restart. **T-3-1361**

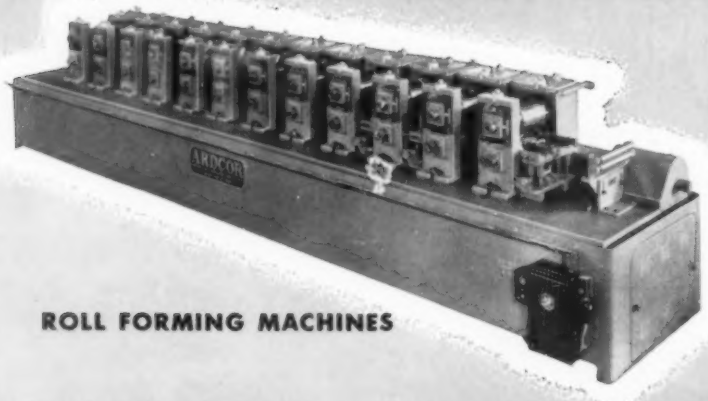
Industrial Bench

This all-steel work stand features many new strengthening developments, such as two legs being formed by a single steel angle. The leg angle runs across the top of the stand, adding both rigidity to the construction and attractive finish.

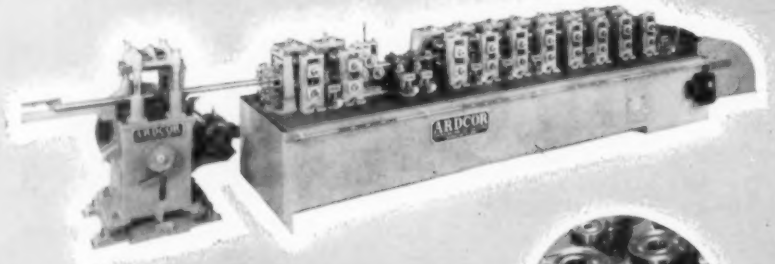
Trays are designed to render stiff and substantial support. A two-inch flange along the side and back is supplemented by a formed hem to provide a smooth edge and also add strength. Forward edges are turned down to afford easy access for cleaning. Gussets are welded to the corners by which trays are bolted to uprights and given additional support. All corners and edges are smooth.

There are eight styles available with and without drawers or casters, two or three trays. The stand measures 32 inches in height, drawers are 18 x 16 x 5 inches, and the trays are 16 x 26 inches. Industrial Bench and Equipment Mfg. Co., Inc., 97 So. St., New Britain, Conn. **T-3-1362**

ARDCOR Engineered
MEANS BETTER COLD-ROLL FORMING



ROLL FORMING MACHINES
PUNCH TYPE CUT-OFFS
LOCK SEAM TUBE MILLS



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— for all makes of machines

American ROLLER DIE CORPORATION
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FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-136

Truck Mixers

A line of inclined axis Hi-Up truck mixers featuring engineered weight to allow for greater legal payloads has been announced by Worthington Corp., Harrison, N. J.

Light weight has been maintained on the mixers without sacrificing the heavy-duty characteristics ready mix operators require. These mixers are also free of all unnecessary, trouble-making gadgets, the manufacturer maintains.

The Worthington truck mixers are built in three sizes, rated according to Truck Mixer Manufacturers' Bureau specifications. The 3-yd, 4½-yd, and 5½-yd machines are each available in two model arrangements. The model LC is equipped with Worthington's simplified full-floating charging hopper with built-in seal. The model LO is equipped with a Worthington fast-charging, open-end type, stationary hopper. The machines can be rated and used as agitators.

By manufacturing a drum of unusually large diameter, the center of gravity of the machine is kept well forward for maximum payload. Thorough mixing of concrete is also aided. The drums are fabricated of abrasive resistant steel with heavier gage at the mixing end. Overlapping drum joints are automatically welded on the outside, space welded on the inside for greatest possible strength at the seams. The abrasive resistant drum blades are die-formed at the discharge end of the drum so there is no resistance to the material being discharged. Correct blade angle, and the lack of any pockets or projections, make the entire blade assembly self-scouring.

The single pair of oversized spiral bevel gears is on the input end of the transmission where they run at engine speed. All other gears are spur-toothed, heat-treated forgings. Clutches for controlling forward and reverse rotation of the drum are multiple disc clutches running in a bath of oil. The transmission has a positive centering device so the neutral position between forward and reverse clutches is automatically located.

Other advantages of the machine are a simplified two-compartment round water tank, an improved, heavy-duty trunnion bearing, die-formed distributing chute and extensions, and greater use of automatic welding throughout.

T-3-1371

Load Pusher

Development of a load-pusher attachment for fork trucks, designed to speed the handling of bulky, unpalletized loads such as baled scrap, paper or textiles, and the loading of highway carriers unable to accommodate fork trucks because of their floor load capacities or low overheads, has been announced by The Baker-Raulang Co.

The pusher allows fork truck users to pick up large, unpalletized loads, haul them to discharge points and unload them in seconds with no manual handling involved. It can also be used to unit-load highway carriers which fork trucks cannot enter. In this application, the operator pushes loads into the carrier without entering it. First-in loads are moved forward in the carrier by the loads that follow.

The pusher takes advantage of a basic law of physics: for every action there is an equal and opposite reaction. Both the action and reaction of the attachment's hydraulic cylinder are used. A free-floating jack is used to actuate and equalize the action of two sets of levers which move the pusher arms. Positive control over pushing pressure is available from the driver's position, through the use of a metering valve.

This feature has been built into the attachment to guarantee smooth handling of any load, regardless of its fragility. Distance from the fulcrum point, center of the truck's front wheels, to the pusher face is considerably less than any other available attachment of this type, providing greater payload capacity and load stability than older designs, according to Baker. Installation of the new pusher on a fork truck reduces the load capacity of the truck only about 10 percent. The Baker load-pusher is available on lift trucks in capacities from 2000 to 6000 lb.

T-3-1372

New XL BOND

FOR CARBIDE TOOL AND CUTTER

Grinding

EFFICIENT ECONOMICAL
ROUGH GRINDING AND FINISH GRINDING
NEAREST THING WE KNOW TO A DIAMOND WHEEL
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Another Chicago Wheel FIRST

"XL" is Chicago Wheel's exclusive new bond for silicon carbide vitrified grinding wheels, especially made for grinding carbide cutting tools. Supplied in most popular sizes and steel backs. Prompt delivery. Keep your production up . . . costs down, with "XL."

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Offices in principal industrial centers
Write for Free Information

CHICAGO WHEEL & Mfg. Co.
Dept. TE,
1101 W. Monroe St., Chicago 7
INDICATE A-3-137

Toolholder

The DB model Brookfield toolholder has reduced body dimensions as compared with the original DA model and yet still will hold any diameter tool from 3/64 to 1/2 inch. The GA model holder has sufficiently increased body dimensions to make possible the holding of any diameter tool from 1/8 to 3/4 inch.

As with the original toolholder, precision grinding of all working surfaces insures that the toolholder's shank and V-Jaw section are permanently parallel within 0.0005 inch in 6 inches. Run-out is less than 0.0001 per inch. Thus perfect tool alignment is automatic.

In use, it is only necessary to insert a tool in this axially-true jaw section of the holder and tighten the jaw screws. Dead center adjustment can then be made by floating the tool into position in the normal way and tightening the unit's locking screws.

The spherical undersides of the heads of these locking screws and the internally beveled washers into which the heads fit provide a balanced-pressure locking assembly which maintains uniform seating and eliminates all possibility of creep or shift during tightening.

Suitable for all kinds of turret lathes, drilling, cutting, and reaming machines, Brookfield toolholders are also useful for accurate positioning of second operation work, and make possible true clamping with minimum space requirements on surface grinders, cylindrical grinders, milling machines, etc.

In reality a miniature, axially-tru vise for holding small parts, these tool holders will hold any shaped tool o tool bit within their extremely wid holding ranges, and provide a simplifie setup for boring, counterboring, cham

fering (inside or outside), and forming and knee-turning.

Further information may be secured by writing Brookfield, Inc., 755 Boylston St., Boston 16. **T-3-1381**

Electric Truck

A rider-type, electrically-powered fork lift straddle truck called the Warehouser, has been designed by the Yale & Towne Mfg. Co., Philadelphia 15.

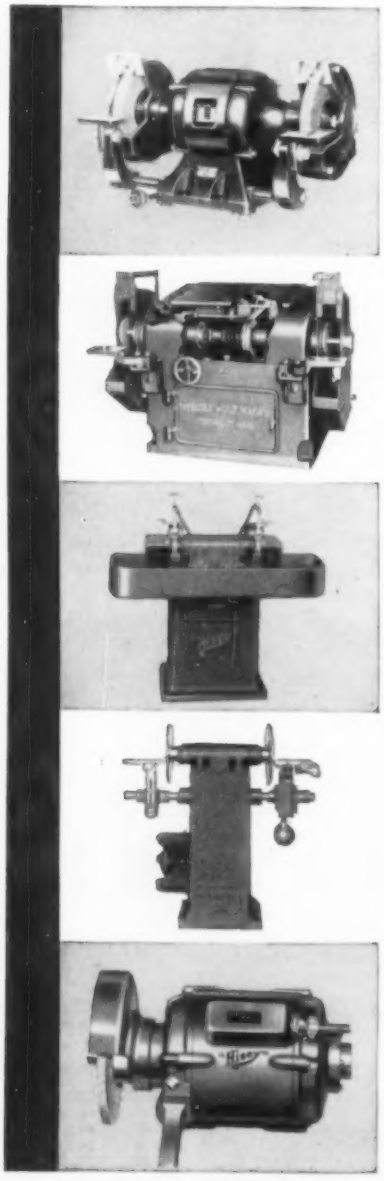
Both short in length and light in weight, it is designed for right-angle tiering in five- to six-foot-wide aisles, and for operating in elevators and on flooring that will not sustain heavier rider-type electric lift trucks.

The truck features three speeds forward and three speeds reverse, with time-delay controls between speeds for smooth acceleration. Available in 2,000 and 3,000 lb. models, it can lift loads as high as 133 inches.

The drive unit consists of a horizontally mounted motor with direct gear drive to splined axle. All gears are mounted on ball bearings; the drive unit is mounted on tapered roller bearings and has a large diameter ball bearing steering ring with a built-in self-aligning feature to assure easy steering under all conditions. The steering unit provides a 200-degree steering arc.

Power is turned off and brakes applied when the operator leaves the truck. The single hydraulic cylinder provides excellent visibility, enabling the operator to see the end of the outriggers for accurate close maneuvering. The Warehouser features an airplane-type steering wheel with spinner knob for quick and easy steering. The enclosed battery compartment with rollers permits easy battery removal from top or side. **T-3-1382**

USE READER SERVICE CARD ON PAGE 133 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION



. . . . . and they lived happily ever after.

That's the way the story ended when you were a kid. It can still end that way if you select "HISEY" for that long tough grind.

Long, trouble-free service is the prime consideration in Hisey Grinders. It starts at the drawing board and continues through all manufacturing operations right up to final assembly. Blended with design favoring operators' convenience, "HISEY" Grinders are surprisingly competitively priced, making them the logical choice of large and small users alike.

The "HISEY" line is unusually complete comprising a wide range of sizes and types including Drill Grinders, Disc Grinders, Wet Grinders and others for various sharpening, snagging, finishing and fitting operations.

Write for catalog 72EE today!

Hisey THE HISEY-WOLF MACHINE CO.
CINCINNATI 8, OHIO
Division of The Cincinnati Electrical Tool Co.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-138

Power Rod Parter

An improved Di-Acro power rod parter for speedily and accurately cutting or parting off rods and bars from $\frac{1}{16}$ to $\frac{5}{8}$ inch without burr and distortion is announced by O'Neil-Irwin Mfg. Co., 625 Eighth Ave., Lake City, Minn.

Principal improvement in the power rod parter is the replacement of an air-operated power unit with a motor-driven flywheel. The flywheel drive, operating at 180 strokes per minute, provides six times the cutting speed previously available.

The motor driven unit also offers greater convenience to the user since it can be installed in any plant where electric current is available.

An Ejectomatic gage, supplied as standard equipment with the power parter, allows the separate operation of gaging, ejecting and cutting to be performed in a single working cycle. Materials can be parted off as fast as the operator can feed stock through the cutting heads and engage the foot clutch. Rate of production varies with length of stock to be cut. Short lengths are gaged and cut more quickly than longer lengths.

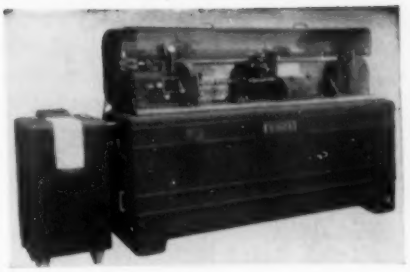
Flywheel motor and other moving parts are housed in a welded all-steel cabinet. Special heads for cutting square, rectangular, hexagonal and other shaped bars can be supplied on special quotation.

Maximum material capacity round steel bar is $\frac{5}{8}$ inch; cutting head thickness one-inch; weight of flywheel, 85 lb operating height 40 inches; floor space 17 x 28 inches. **T-3-1391**

Cam Comparator

Vinco Corp., 9111 Schaefer Highway, Detroit 28, announces a camshaft comparator. Engine camshafts are checked against a master cam to determine the variances in the cam contour of the part. The master cam is ground and lapped to an accuracy of 0.0001 inch. Cam contour variances are shown on a 0.0001-inch dial indicator and simultaneously recorded on a linear chart. The dial indicator readings and chart recordings are identical and will repeat within 0.0001 inch. Cam lobe and keyway timing errors are shown on an inbuilt, Vernier equipped, graduated plate and the timing check is accurate to within one minute of arc. Although the instrument is tooled for an individual camshaft, a wide range of sizes can be accommodated. Work capacity is as follows: between centers, up to 44 inches; journal diameters, up to $2\frac{3}{8}$ inches; cam base circles, up to $1\frac{5}{8}$ inches; cam rise, 0 to $\frac{3}{8}$ inch.

Camshafts that are similar in all respects, except cam contour, may be inspected by making minor change-overs. This may require up to $\frac{3}{4}$ of an hour of setup time. A major tooling change-over is necessary if an entirely



different camshaft is to be inspected. This would require up to $1\frac{1}{2}$ hours of setup time. Full inspection of a camshaft (cam contours, cam relationship, and timing) requires approximately 30 minutes. Highly trained technicians are not needed. **T-3-1392**

USE READER SERVICE CARD ON PAGE 133 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

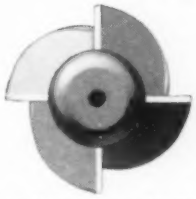
AN IMPROVED STANDARD COUNTERBORE DESIGN by ECLIPSE

NEW!

FLUTE DEVELOPMENT GIVES YOU

★ Deep counterboring with a *wider range* of pilot sizes.
★ A higher helix angle which assures *faster chip disposal.*
★ New tooth construction thus providing maximum *heat dissipation.*

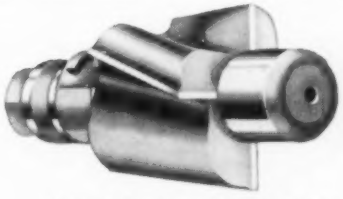
The DIFFERENCE at a glance!



End view of counterbore showing conventional flute form, designed for spot facing and *shallow* counterboring.

New style flute form designed for spot facing and deep counterboring, chips can flow freely from pilot diameter.

Side view of counterbore showing conventional flute design which provides ample chip clearance for shallow counterboring and spot facing.

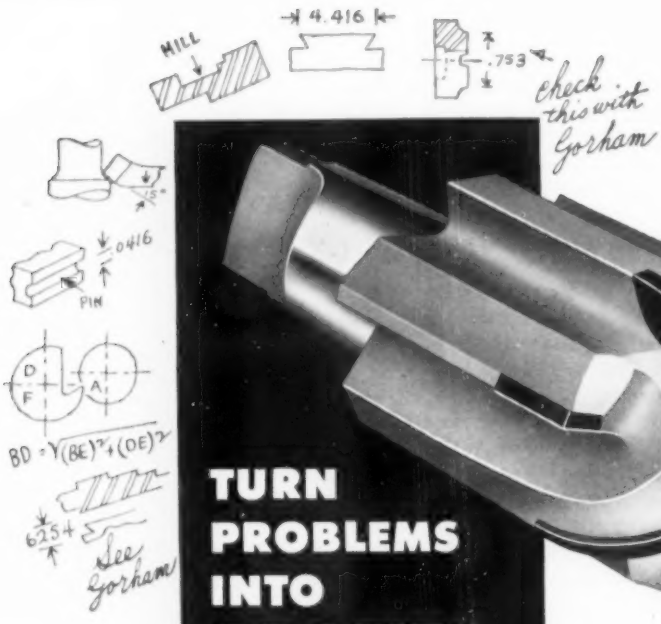


New style flute form with increased helix angle permitting faster chip removal, thus reducing heat to a minimum in deep counterboring.

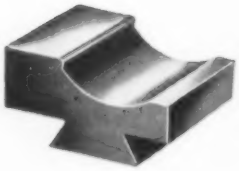
Our present stock is being replaced with the new design as rapidly as possible so that in the very near future all orders will be filled with this later design within the range of sizes provided.

ECLIPSE COUNTERBORE CO.
Founded in 1913
DETROIT 20, MICHIGAN

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-139



with *Gorham*-ENGINEERED SPECIAL CUTTING TOOLS



Next time you're up against a tough tooling problem, call in the man who can give you *the right answers fast* . . . your nearby Gorham Field Engineer! He's an expert in special cutting tools . . . and he's ready to provide a complete engineering service to determine your exact tooling requirements. He starts with your product, sketch or idea. He surveys your production operations and available equipment. He considers work material properties and desired finishes and tolerances. He plots proper machine feed, speed and method of tool driving. Then he develops practical design and engineering specifications for special cutting tools, metallurgically "tailor-made" for your application.

His recommendations are backed by Gorham's unmatched facilities, which include three fully-equipped modern plants, a large Engineering and Metallurgical staff, and a force of field application engineers in principal industrial centers, coast-to-coast. All are dedicated to furnishing prompt and profitable solutions to your special tooling problems. Gorham-engineered "specials" are turning problems into profits in thousands of plants every day . . . why not let them do the same for *you?* If you haven't met your nearby Gorham Field Engineer, write for his name, or send details of your problem direct for recommendations.

Gorham TOOL COMPANY

"EVERYTHING IN STANDARD AND SPECIAL CUTTING TOOLS"

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WEST COAST WAREHOUSE: 576 North Prairie Ave., Hawthorne, Calif.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-140

Master Comparator

This comparator provides practica high-precision dimensional comparison Its friction-free sensitivity assure repetitive accuracy that makes possi ble fine measurement to a high degree All amplification is accomplished by a electronic circuit.

One of the features of the instrument is the fact that a constant pressure is applied to the sides of the workpiece by each contact at every point of measurement. This pressure is exactly the same for every part inspected. The design of the mechanism that makes this possible is one of the basic objectives in designing the instrument.

The operator has a selection of four magnifications: 500 to 1, 1,500 to 1, 5,000 to 1, and 15,000 to 1; all on the same meter. These magnifications together with the exceptional range of the measuring contacts make it possible for the operator to use the same instrument to trace work from rough grind to finished lap with the ease of the setup on low magnification, and then quickly switch to high magnification for accurate size determination.

The repetitive accuracy is high. All friction has been eliminated by means of a free-floating measuring system. An operator observing common sense precautions, such as constant temperature, cleanliness and correct operating procedure, can obtain repeat readings and detect dimensional variations even to plus or minus one millionth inch.

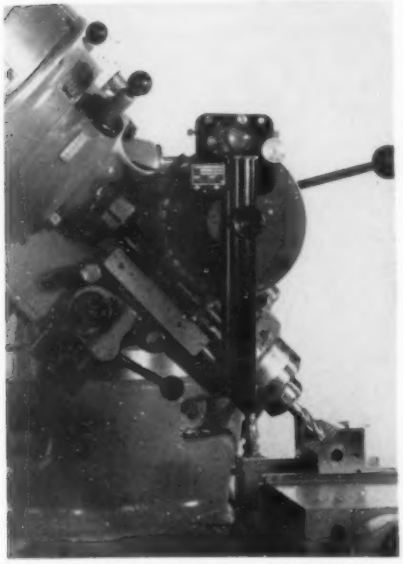
Though the instrument is exceptionally sensitive to fine measurement there is ample overtravel in the measuring unit with no chance of damaging it or losing calibration.

Made by Federal Products Corp., 1144 Eddy St., Providence 1, R. I.

T-3-1401

Collimator

Announced by Safe Flight Instrument Corp., White Plains, N.Y., is the G-12 goniometer collimator, an optical tool that when attached to machine tools, or used for inspection purposes, measures angles to great precision, and yet is simple enough for ordinary shop operations. Collet and lathe tool angles, for instance, can be easily checked, and bedway flatness can be measured to within 0.00007 inch.



The G-12 collimator, which combines ruggedness of design with proved optical theory, speed of measurement and simplicity of setup, makes all types of angular measurements accurately and rapidly. It eliminates the use of time-consuming sine bar setup techniques, and can be used to the same degree of accuracy by semiskilled workers as by experienced operators.

The collimator requires no calibration, is completely self-checking, and entirely eliminates the necessity of costly jigs and fixtures. Because it is self-aligning, it need only be clamped to any convenient support, without requiring mounting on a special bed or surface. It measures continuously and, unlike fixed gages, can incorporate engineering changes without requiring expensive gage work. One hundred percent inspection of parts can be made in less time than that required by usual sampling inspection methods. Parts can be checked at an inspection rate of several per minute to a sensitivity of less than 0.002 degrees, even when the collimator is used by inexperienced operators.

In addition to the standard type of angular and flatness measurements, the Safe Flight G-12 collimator can also perform many tasks normally impossible to do by any other measuring means. The collimator peers into deep and narrow recesses, where no other instrument can penetrate. It can check an angle on a flat as small as 0.004 sq. in.; it can set up an angle or surface using any plane surface as reference, even if this reference surface is as far as 20 feet away, and will retain its normal accuracy of measurement at this distance, without requiring the use of special jigs or elaborate setup. Further details can be obtained by writing the manufacturer.

T-3-1411

Quick Labels

A quick and positive method for labeling containers holding hazardous materials is announced by the W. H. Brady Co. Milwaukee.

Known as Brady Quick-Label container markets, these labels stick fast to glass, metal, wood, plastic or ceramic containers, without moistening. They are made of strong cotton cloth, and are silicone plastic-coated to resist oil, grease, grime and abrasion. The label surface is not affected by most of the materials the container may hold.

State laws require different hazardous materials to be labeled with the same warning words, such as Danger, Flammable, or Vapor Harmful, followed by precautionary instructions, such as Keep Away From Heat (Sparks) and Open Flame, Use with Adequate Ventilation, or Avoid Prolonged Contact with Skin. Most container markers are printed with these various warning words and precautionary instructions, and have a space provided on each marker for a self-sticking insert. Each insert has the specific name of the hazardous material, such as acid, naphtha, lacquer or kerosene, printed on it. Thus with a few container markers and inserts, a variety of labels can be made up to identify the contents of different containers.

For further information and free samples, write to W. H. Brady Co. Dept. TE, 727 West Glendale Ave, Milwaukee 12. **T-3-1412**

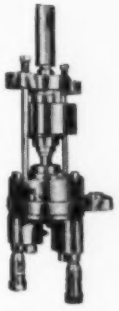
ERRINGTON

Headquarters for

HIGH SPEED PRODUCTION TOOLS

FULLY ADJUSTABLE DRILLING HEAD

Here's a light, compact tool with a wide range of adjustment. Can drill on squares, rectangles, circles, triangles and irregular patterns.

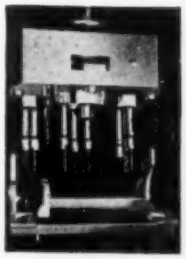


ADJUSTABLE TAPPING HEAD

Fully geared. Needle bearings on all spindles in head. Ball thrust bearings throughout. Bronze bushed. Sand cast aluminum case.

ADJUSTABLE DRILLING HEAD

This versatile tool permits you to take advantage of a wide range of adjustment without overhang.



MULTIPLE SPINDLE HEADS

Shown is a ten spindle multiple drilling head, drilling ten varied size holes on different elevations.

Write for Complete Information

Established 1891

ERRINGTON

Mechanical Laboratory, Inc.

Main Office and Plant

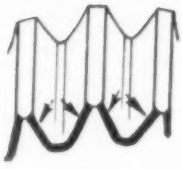
Staten Island 4 New York

INDICATE A-3-141

Model 2029 BURR-MASTERS for chamfering and burring flywheel ring gears.

CHAMFER and BURR up to 20 TEETH PER SECOND!

Burr-Master **completes 156-tooth flywheel ring gear in 12 seconds**



Type of chamfer produced on 20 flywheel ring gear teeth per second.

BURR-MASTERS have revolutionized the burring and chamfering of all gears and splines. Cleanly chamfering and removing burrs from the teeth of 240 flywheel ring gears per hour is something you can expect only from a BURR-MASTER.

Gears are loaded and unloaded without stopping the BURR-MASTER. The unskilled operator merely places the gear on the spindle. The rest is automatic. Cycle indicator light tells when the gear is finished.

Ask for Bulletin 103-50

MODERN *Industrial Engineering Co.*

*Reg. Patents applied for

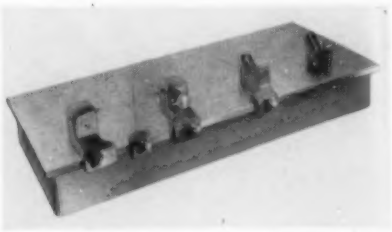
14230 BIRWOOD AVE.
DETROIT 4, MICH.

Inspection Unit

A fully integrated inspection unit incorporating all devices normally required for close dimensional checking of precision machined parts, has been patented and announced by Swanson Tool & Machine Products, Inc., Erie, Pa.

Said to require less tool investment than equivalent nonintegrated inspection devices, the Swanson unit also claims savings in floor and bench space and reduced inspection costs through added convenience and quick setups.

The basic unit includes five fundamental checking tools: surface plate, bench centers, V-blocks, sine plate and



indicator attachment, plus an exclusive concentricity attachment which permits rapid checking of relative diameters and bores in round or square parts of variable outside diameters. This is accomplished by a vertically adjustable V-block, positioned by a calibrated, direct-reading adjusting screw to compensate for diametrical differences up to 4½-inches in shafts as large as 7¼ inches in diameter. No involved computation is needed. The opposed V-block is horizontally adjustable to accommodate parts up to 50 inches in length.

All devices are automatically aligned and are easily attached, adjusted or removed from the 60-inch surface plate by means of a knurled hand screw. The surface plate itself is available in 12 or 24-inch width, ground to within 0.001 inch or scraped to within 0.00025 inch.

The bench centers will accommodate shafts up to 48 inches in length and 8 inches in diameter. The V-blocks have a 7¼-inch diametrical capacity. The sine plate is hardened and ground tool steel 5 x 2¾ inches. Optional accessories are also available for special-purpose inspection.

According to the manufacturer's specifications, all cast parts are of high tensile iron, heat treated and normalized. All wear parts are of tool steel, hardened and ground. Tolerances throughout are fully within precision inspection standards. **T-3-1421**

USE READER SERVICE CARD ON PAGE 133 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-142

Chuck Force Indicator

Accurate measurements of the gripping strength and distribution of forces in an automatic chuck are quickly obtained by a Foxboro Nultronic indicator, used with a suitable force cell. A typical setup for machine shop application is illustrated and described in a data sheet, AED 340-8, available on request from The Foxboro Co. Foxboro, Mass.

In operation, the instrument is connected to the cell which is held in a jig. The jig, representing a piece of work, is centered in the chuck and rotated until the cell is in measuring position opposite a jaw. With the chuck closed, the machinist simply turns a balancing knob at the center of the instrument until the null indicator needle on the upper scale reads zero. From the value then indicated on the center scale, the amount of loading force or pressure is readily converted into pounds or other convenient units. The cell is rotated to each succeeding jaw until all forces are measured. Chuck power can then be adjusted so that jaw forces are equalized.

A portable, battery-operated, electronic instrument, the indicator can be carried easily to any part of the shop. Its aluminum case, with carrying handle, measures 9½ x 12 x 6 inches and is designed for heavy industrial service. The center dial with its 10-inch scale is easy to read. Accurate to ± ⅒th of 1 percent, the instrument provides laboratory precision in determining the amount and uniformity of force applied by the chuck. **T-3-1431**

USE READER SERVICE CARD ON PAGE 133 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

TURNING A MOUNTAIN INTO A MOLEHILL

GREER Accumulator

Reduces Machine Floor Space and Power Requirements

Greer Accumulator installation having performance ability comparable with weight-loaded accumulator shown above.

A weight-loaded accumulator in a rubber molding plant. Compare its size with installation at left.

Functions Performed by **GREER ACCUMULATORS**

1. PRESSURE STORAGE CHAMBER to provide
   a. Main source of hydraulic power.
   b. Auxiliary power source.
   c. Emergency power source.
2. PRESSURE-VOLUME COMPENSATOR for
   a. Leakage compensation.
   b. Temperature compensation.
3. DISPENSER OF FLUIDS and Lubricants.
4. TRANSFER BARRIER for Fluids and Gases.
5. SHOCK ABSORBER to
   a. Absorb line shocks.
   b. Reduce pump pulsations.

Greer Hydro-pneumatic Accumulators offer you more advantages than any other type. They are low in cost, weight, and size, and high in efficiency, dependability, and safety. They maintain gas precharge pressure, and will not leak fluid. Installation is simple. Very little accessory equipment is required.

Greer Accumulators can reduce the size, cost, and power requirements very substantially in intermittent duty systems. Presses that normally require 50 hp motors operate more efficiently and economically with 1½ hp motors and Greer Accumulators. Let us show you what Greer Accumulators can do for you. Write or phone.

GREER ACCUMULATORS

U. S. PATENTS UNDER OLEAR LICENSES

Greer Hydraulics, Inc.
441 18th Street,
Brooklyn 15, N. Y.

Sales Representatives in Principal Cities

District Offices: 407 So. Dearborn St., Chicago 5 • 2832 E. Grand Blvd., Detroit 11

Manufactured and distributed under license in Great Britain by Finney Presses Ltd., Berkeley St., Birmingham 1, England.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-143

Tool-Tester

A device known as the Pow-R-Safe tool-tester is said to quickly and accurately detect electrical defects in electric hand tools and extension cords. The safe working condition of such electric hand tools as drills, screwdrivers, nutrunners, saws, grinders, sanders, soldering irons, together with cords, can be instantly determined by simple finger-tip controls. By simply pressing buttons, familiar red and green lights flash to indicate the following conditions: proper equipment ground as safe; open equipment ground as unsafe; power ground as unsafe; short circuit as unsafe; good tool switch and extension cord as safe; defective or shorted tool switch or extension cord as unsafe; whether or not tool is in proper mechanical running condition. Complete tests are performed in less than 10 seconds, and preliminary tests are conducted at a safe six volts to avoid electrical shock to the operator if the tool is faulty. Simple, foolproof operation permits electrically untrained persons to conduct the tests efficiently. Installed in a tool crib, the Pow-R-Safe tool-tester permits tools to be safety-checked upon issuance, and at time of return to crib. Faulty tools can be immediately spotted and tagged for repair before they can cause an accident. Weighing six pounds, the unit is completely portable to safety-check tools at point of operation. In addition to safeguarding workers from injuries caused by electrically defective equipment, it is also claimed that production delays caused by blown fuses are greatly reduced. Complete details may be obtained from Fendall Co., 4633 N. Western Ave., Chicago 25.

T-3-1441

Cut Costs in Large Hole or Deep Hole Drilling with WAUKESHA *Inserted Blade* SPADE DRILLS

WAUKESHA *Inserted Blade* SPADE DRILLS are low in first cost. Further, each size of tool holder accommodates blades with diameter variations up to ½ inch. One holder does many jobs.

And the WAUKESHA Spade Drill body lasts for years and years. Like your safety razor you replace only the blade when finally worn out. WAUKESHA Inserted Blade SPADE DRILLS are the most practical tools for turret lathe and deep hole drilling. Both types of WAUKESHA SPADE DRILL Holders have coolant holes which assure an ample supply of coolant to flush out chips. Try WAUKESHA SPADE DRILLS in your plant. Order one today.

WAUKESHA SPADE DRILLS with short length heads

WAUKESHA Spade Drills are available with stub heads for use with your own holders and adapters for extremely deep hole drilling. Make your holder to fit your job and pay no premium for a "special" tool.

Wide Range of Sizes in Stock

Standard sizes from 1-1/32" to 5" in constant stock. Orders for special sizes or special types (such as rear piloted and short length spade drills) are given immediate attention.

FREE! New quick reference catalog. Gives complete specifications of all standard tools and prices. Send for it today.

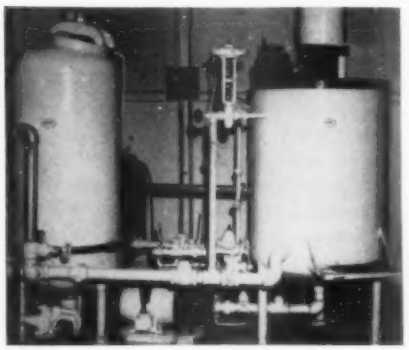
WAUKESHA TOOL COMPANY
1428 Arcadian Avenue
WAUKESHA, WISCONSIN

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-144

Pressure Filter

A tank-type pressure filter, introduced by the Ogden Filter Co. for the filtering of chemicals, electroplating solutions, oils, the recovery of wastes and treatment of waste water, eliminates all cloths, papers, screens and pads. Yet, the unit insures controlled quality filtration and higher flow rates at much lower operating costs both in filter material and labor, it is claimed.

Special construction of the filter accounts for its efficient performance. A series of synthetic, rigid porous stone membranes upon which the filter-aid coating is deposited provide a retaining surface for the formation of a controlled clarity filtration, and allow a



fast and thorough backwash.

The use of diatomaceous silica, the flexible and least expensive of filter media, supplies desired clarities at exceptionally high flow rates. The filtration cycle is greatly lengthened due to the fact that a new filtering surface constantly increasing in size is presented to the liquid being filtered. Complete cleaning and even sterilization of the filter can be accomplished without opening the chamber. A patented tank closure permits the unit to be opened for inspection or adjustment by the release of two bolts.

Available in all capacities in all metals and alloys as well as plastic or rubber lined to meet specific problems, the pressure filters are manufactured by Ogden Filter Co., 4214 Santa Monica Blvd., Los Angeles 29.

T-3-1442

Torque-Limiting Wrench

Design of a Proto precision torque-limiting wrench without the usual external indicating devices has been announced by Plomb Tool Co. Los Angeles. It is suited for nut and bolt torquing by almost all types of industries and by all mechanics.

The Proto torque wrench differs from most conventional types in four basic respects. First, it is a torque-limiting device releasing automatically at proper setting and not a torque-indicating device requiring dials, pointers, scales, sound indicators, etc. Second, it employs a fully enclosed precision spring under compression as the principal torque-controlling element. Third, it uses an accurate micrometer-type adjustment. Fourth, models with a built-in reversible ratchet head are available that do the work of both a ratchet and torque wrench.

Desired torque is set by turning the handle, just like a micrometer. When the right torque is reached by pulling the handle, the wrench releases automatically and signals the operator with a positive reflex action. Upon removal of hand pressure, the torquer resets automatically for the next operation.

According to the manufacturer, the design is accurate, versatile, easy to use, safe, rugged, and much faster than types with indicating devices.

Six models are currently available, three with ratchet head and three with plain head. Capacities are 5-75 or 10-150 ft-lb. Drive sizes are $\frac{3}{8}$ or $\frac{1}{2}$ inches. **T-3-1451**

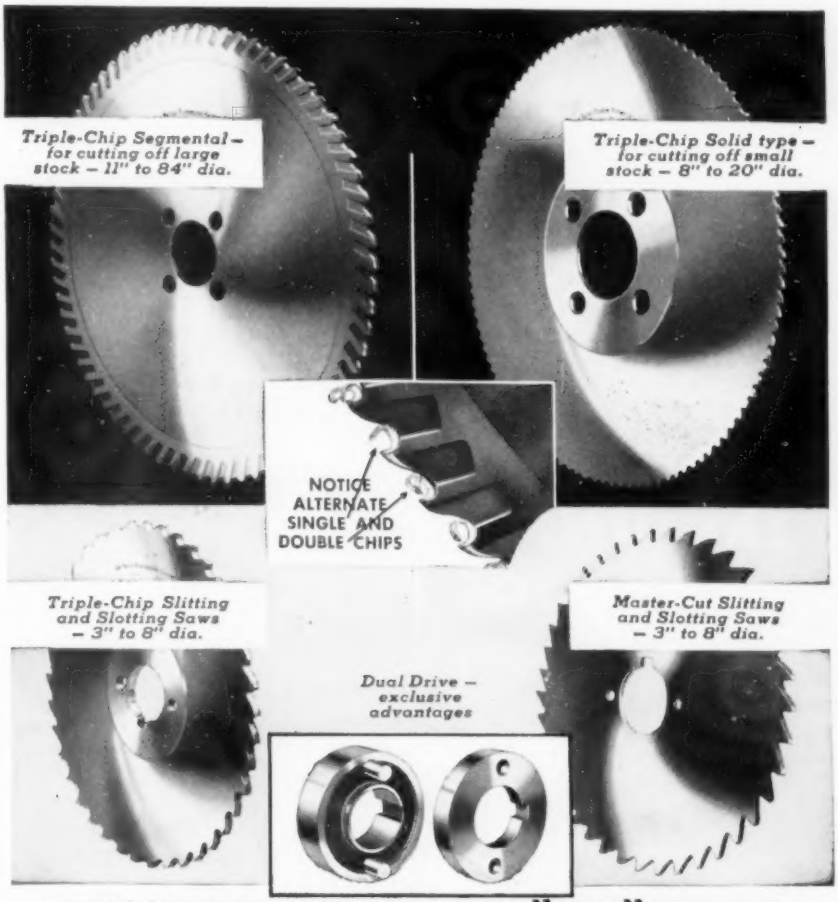
Portable Surface Plate

Designed particularly for the convenience of inspectors in toolrooms and close tolerance production plants, The Elkro Co., 734 Albany St., Dayton, Ohio, has announced its line of portable granite surface plates. The combination of a sturdy industrial stand with a Velsey granite surface plate provides a valuable and essential tool for the guardians of quality in the jet-power industry.

According to the manufacturer, the granite surface plates will retain their surface accuracy of 0.00005 inch or less over a period of years. Demonstrating the fact that the performance of these granite surface plates has fully justified this claim, the manufacturer guarantees the close tolerance surface accuracy of all stock plates for a period of 10 years.

Among the advantages claimed for the portable granite surface plates are: extreme accuracy, nonmagnetizing, nonrusting, nonwarping, shock proof, nonabrasive, greater than tool steel hardness, portability for convenience and multiple uses, and the enduring flatness and hardness of selected granite. The granite from which these surface plates are manufactured was chosen only after a complete and comprehensive study of all the types of granite available in the United States. This granite possesses the properties of minimum porosity, a dense, tightly fuzed crystalline structure consisting of a hard material to provide wearing quality and accuracy and a softer material, evenly dispersed throughout, to provide the relief that keeps tools from wringing down on the plates. There is practically no tendency of the granite surface plate to soak up dirt and abrasive materials. It, therefore, remains clean and smooth so that there is no danger of causing wear on measuring instruments.

T-3-1452


Triple-Chip Segmental – for cutting off large stock – 11" to 84" dia.
Triple-Chip Solid type – for cutting off small stock – 8" to 20" dia.
NOTICE ALTERNATE SINGLE AND DOUBLE CHIPS
Triple-Chip Slitting and Slotting Saws – 3" to 8" dia.
Dual Drive – exclusive advantages
Master-Cut Slitting and Slotting Saws – 3" to 8" dia.

TO CUT OFF STOCK, SLIT OR SLOT, THE MOTCH & MERRYWEATHER TRIPLE-CHIP SAW BLADE OFFERS MANY EXCLUSIVE ADVANTAGES

Fast, burrless cut-off and slitting or slotting with with Dual Drive which makes stresses and breakage negligible. Let M & M Triple-Chip saw blades give you the higher *production-with-accuracy* which Industry must attain and maintain today. Also Master-Cut conventional type with M & M's exclusive Dual Drive. Ask your dealer.

★ ★ ★

ALSO TRIPLE-CHIP ANTI-WELD SOLUBLE OIL

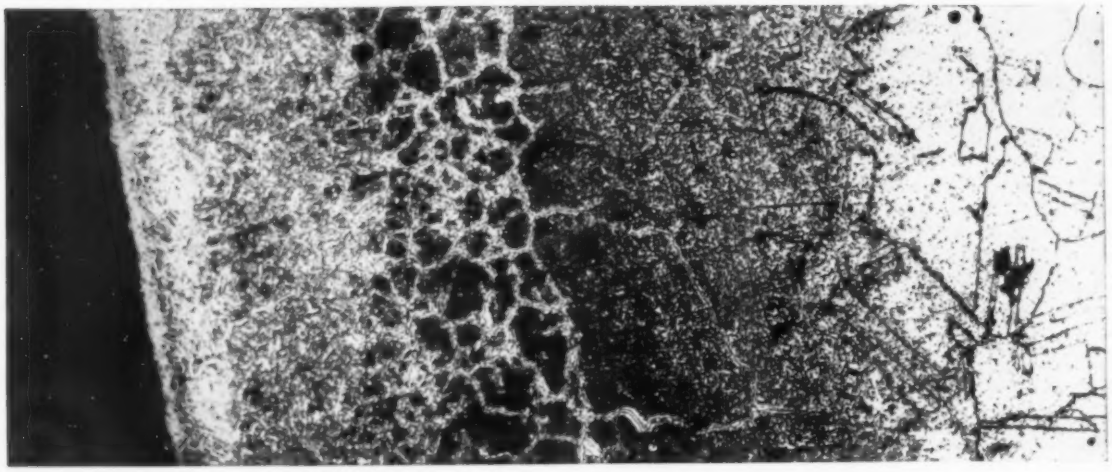
For the most favorable results, time- and profit-wise, use Motch & Merryweather's superb coolant. Anti-weld, averting pick-up. Sharper tools and longer-lived. Oily, but not "greasy". Smokeless, odorless. A real aid to money-making production.

Triple-Chip METHOD

THE MOTCH & MERRYWEATHER MACHINERY CO.
715 PENTON BUILDING • CLEVELAND 13, OHIO
...IT'S THE COST PER CUT THAT COUNTS...

Only M & M builds ALL 3: CIRCULAR SAW, SAW BLADE, BLADE GRINDER

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-145



Carbidizing Process for Non-Magnetic Steel

A carbidizing process for non magnetic steels is now available to tool engineers and designers. Case-hardening of the 300 series of stainless steel by this process has been in use for some time on various machinery parts where it is important to maintain non magnetic properties while treating the steel for improved abrasive wear.

Its first use for cutting tool steel was in making splicing knives or cutters for film employing magnetic sound tracks. Here it removed the objectionable boom to be heard at every splice.

The accompanying microphotograph shows the complete carbidized case with gradient penetration through to the parent metal. This cross-section is at 350X and enlarged for study. The specimen pictured was done in molten Hi-Speed-It compound for 30 minutes at 1800 degrees F, quenched in oil, dipped in diluted hydrochloric acid, then washed in water, and buffed.

For further information, write for metallurgical bulletin 16, Wilson Carbon Co., Inc., 60 East 42nd St. New York 17. **T-3-1461**

Hydraulic Tool

Three improvements in the AMP hand hydraulic tool, which crimps AMP heavy-duty solderless terminals to stranded or solid wire, have been announced by Aircraft-Marine Products, Inc., Harrisburg, Pa. This self-contained unit has interchangeable die inserts for eight wire sizes from No. 8 to No. 4/0.

The tool head, in which the crimping dies are inserted, has been redesigned and provided with a spring-loaded latch. This provides split-second opening to permit quick removal of the completed terminal, as well as to remove the tool from continuous wire and to change the dies.

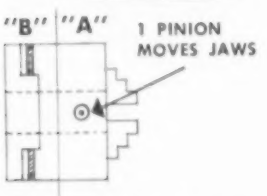
Complete 360-degree axial rotation of the head has been provided to permit crimping of terminals to cables in cramped or awkward locations. Because the seam in the barrel of AMP terminals is brazed, presenting an even crimping surface, it is unnecessary to orient the terminal in the crimping dies.

A cradle is now provided as standard equipment with this tool, which permits its convenient use as a bench tool. Off the bench, it protects the tool and facilitates handling. A strap may be passed through a slot in the cradle for supporting the tool on a pole, enabling the operator to use both hands. If desired, the cradle may be easily detached from the tool.

This tool develops 12 tons' crimping pressure safely and easily. Its preliminary take-up feature holds the terminal in the dies while the wire is inserted, making one-man operation quick and efficient. When the crimp is completed the pressure is automatically released, eliminating all guesswork in obtaining perfect, uniform terminations. **T-3-1462**

USE READER SERVICE CARD ON PAGE 133 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

The UNIVERSAL Chuck with .0005 PRECISION!



HOW and WHY it Works

Chuck gripping section "A" is like any scroll chuck with one pinion to make jaws. (accurate to .003"). Section "B" shows how chuck "floats" on adapter (.020" clearance) where 4 opposed screws move chuck on adapter for adjustment to dead true precision. Jaws always come back within .0005" on duplicate work.

Buck AJUST-TRU CHUCKS

6 JAW 6" CHUCK HANDLES WORK OF 93 COLLETS!

The capacity of $1,000 worth of collets for your tool room PLUS scroll chuck re-chucking speed on duplicate parts with .0005" precision . . .

The firm grip of 6 jaws for soft metal or tube work . . .

An end to most needs for stub arbors, mandrels, or special fixtures . . .

A reliable precision chuck adaptable to lathes, screw machines, grinders, dividing heads . . .

The greatest development of recent years to save machinists' time . . .

That's the brief story of this sensational Ajust-Tru chuck. It is unbelievable — but true! Send for catalog with full details.

SIZES AVAILABLE

3- and 6-Jaw Chuck—4" (light duty); 5", 6", 7½" (heavy duty)
2-Jaw Aviation Chuck—6", 7½" (heavy duty)

BUCK TOOL CO.

333 Schippers Lane • Kalamazoo, Mich.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-146

Honing Machine

Features on the model 844 microflat microhoning machine for precision finishing of optically flat surfaces up to 20 inches in diameter, manufactured by the Micromatic Hone Corp., Detroit 4, include four different speeds in the head, simultaneous changing of spindle and wheel speeds, motorized wheel dresser mounted on machine, control of head oscillation, and pneumatic lift up of spindle.

Spindle speed may be changed, independent of wheel speed, by simple insertion in the head of any one of four worm gears, ranging from single to quadruple thread. Direction of spindle rotation is controlled by a clutch that has three positions: forward, neutral, and reverse.

A knob at the lower right rear side of machine permits easy access to changing spindle and wheel speeds together. The abrasive wheel is geared to the same motor that drives the spindle, so that the speeds of both spindle and wheel may be proportionately changed at the same time by the one control.

To permit the permanently mounted motorized dresser to swing over the wheel in the dressing position, the head may be moved without disturbing its previously set oscillating stroke.

An air cylinder adds to operator convenience by providing easy lift up of spindle and attached fixture. To save time in lowering the spindle to microhone an additional number of identical parts, an adjustable stop on the quill housing permits repetition of height setting and adjustment for wheel wear.

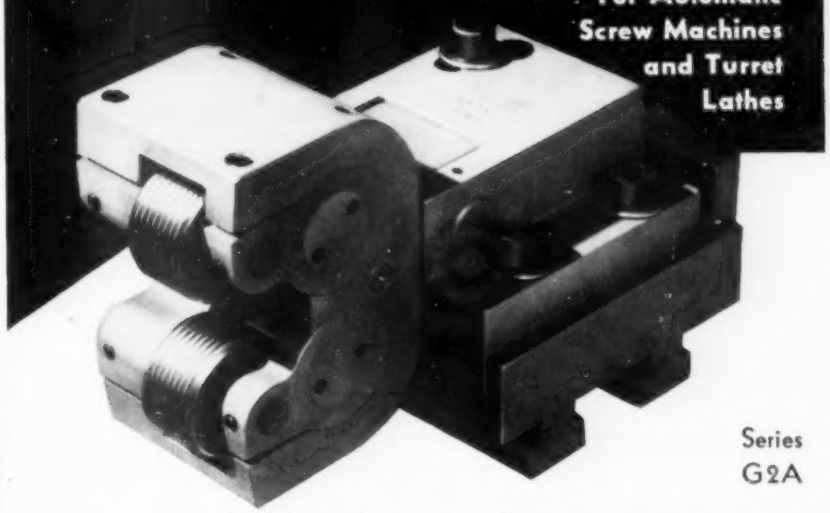
T-3-1471

USE READER SERVICE CARD ON PAGE 133 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

REED RTD

Thread Rolling Attachments

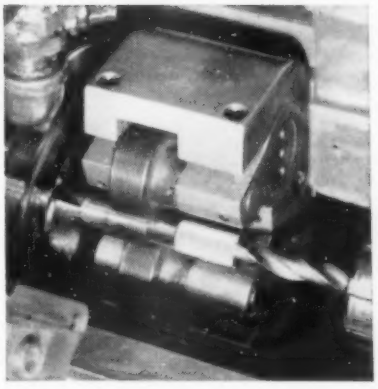
For Automatic Screw Machines and Turret Lathes



Series G2A

✶ Full Diameter Range to Capacity

✶ Simple Precision Matching . . .



Reed attachments have two opposed rolls which pass over the work when rolling the thread. They are easy to set up and rolls may be quickly changed and adjusted for size. A simple device provides for precise matching of the rolls.

Thread rolling is accepted as an economical and preferred method of producing smooth precision threads on automatic screw machines and turret lathes at high production rates. It permits threading close to shoulders and since rolling can be done on the collet end of the part behind shoulders, a secondary threading operation is often eliminated.

The series G2A Reed Thread Rolling Attachments are multi-purpose tools currently built in four popular standard sizes. Each attachment will accommodate an unlimited range of diameters within its capacity—only a single attachment is required for rolling all diameters within the size range. Straight or taper threads may be accurately rolled whether they are right or left hand or have multiple leads.

Send us specifications of your requirements and let us supply you with complete information.

REED ROLLED THREAD DIE CO.

THREAD ROLLING MACHINES and DIES • KNURLS • THREAD ROLLS

Worcester, Massachusetts, U.S.A.

Sales Offices in: Buffalo, Chicago, Cleveland, Compton, Calif., Detroit, Englewood, N. J., Houston Indianapolis, Milwaukee, Montreal, New York City, Philadelphia, Pittsburgh, St. Louis, Syracuse, Toronto

928

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-147

Pneumatic Cylinders

Carter Controls, Inc., 2800 Bernice Road, Lansing, Ill., announces the development and production of a key type pneumatic cylinder. The new cylinder has a number of features which make it desirable from an application and service standpoint.

A unitized cartridge rod bearing has been developed to both aid in servicing and reducing wear caused by misalignment. Included in the cartridge unit are a long bronze rod-end bearing, rod packing, and a self-centering packing at the pivot point. This cartridge can be replaced without disassembly of the cylinder simply by removing a snap ring, pulling out the unitized bearing and dropping in a new cartridge.

Cast steel mounts are standard equipment and are an integral unit combined with the head and rod caps of the cylinder. These head and mount combinations are easily disassembled by

removing the internal locking key ring which unites the head and cylinder wall. There are no bolts used in this construction eliminating the possibility of loosening.

This design permits the cylinders to be the smallest in diameter and length at no sacrifice in strength.

Heavy wall tubing, chrome-plated rods, rod scraper and milled wrench flats on rods are standard in all cylinders. The cylinder heads are locked in place in a counter-bored section of the tubing wall at the ends of the cylinder. This counter-bore enables the piston and rod to be easily removed from either end without danger to the packing. Pipe ports can be oriented at random due to the 360-degree rotation of the ends which is made possible by the key type construction.

Sizes available are 1½ through 8-inch bores with a stroke of any length up to 18 ft. All standard mounts are available. **T-3-1481**

LIGHT...

DURABLE...

WORKABLE...

Pioneer Tooling Plate Formula

921-T

Savings up to 30 percent are reported by recent users of Pioneer Formula 921-T cast aluminum plate.

For your

DRILL JIGS
MILL FIXTURES
FORM DIES
ASSEMBLY JIGS
BRAKE DIES
WELDING FIXTURES
HYDRO FORM BLOCKS
STRETCH FORM DIES

For further information...

PIONEER TOOL ENGINEERING, INC.

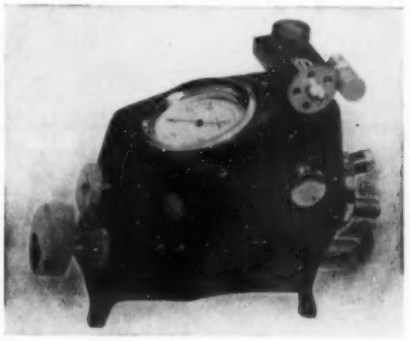
1601 EAST EL SEGUNDO BOULEVARD, EL SEGUNDO, CALIFORNIA

El Segundo 2140 • ORegon 8-5073

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-148

Hardness Tester

The Penetrascope, a portable metal hardness tester employing the most accurate method of hardness testing known, is now being sold exclusively in this country by C. Tennant Sons & Co., 100 Park Ave., New York 17. The instrument tests ferrous and non-ferrous metals in a wide range of sizes and shapes and is used on large or small work in place, in the shop or laboratory.



A variety of standard clamps electromagnetic, chain and C-clamps, are available and others can be designed for special applications. A special combination of Penetrascope and electromagnetic stand can test many normally inaccessible parts of large assembled or partly dismantled units.

The Penetrascope has a 136-degree pyramidal diamond indentor that makes a minute impression under controlled load and the diagonals of the impression are measured within an accuracy of 0.001 mm. The load on the diamond indentor can be set at any point from one to 30 kilos to suit the hardness of the metal being tested. Ball type indentors of one-mm and two-mm diameters are supplied for testing cast iron and other large grained metals. **T-3-1482**

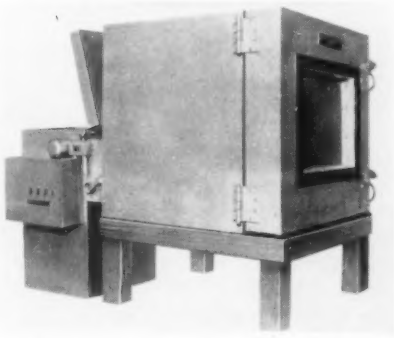
Environmental Test Units

Tenney Engineering, Inc., 26 Avenue B, Newark 5, N. J., announces a standard line of high and low-temperature environmental test equipment designed to provide test conditions for the majority of temperature testing requirements. This standardization permits purchasers to select chambers from existing specifications and eliminates the extra cost of custom built models.

Comprising two separate units, the Tenney servo unit and the Tenney companion test chamber, the equipment furnishes controlled temperatures for conducting physical tests, weathering tests, and aging tests. The units may be purchased independently or collectively. A simple attachment will maintain relative humidity from ambient to 95 percent in a temperature range from ambient to +180 degrees F.

The servo unit is a portable air-conditioning unit which can be connected to laboratory enclosures to provide air circulation of 40 cfm. At —100 degrees F this circulation will absorb 1700 BTU per hour. At temperatures to 185 degrees F this circulation is capable of delivering 5,000 BTU's heating effect.

Low temperatures are achieved by circulating air over dry ice. High temperatures are achieved by circulating air around electric heaters.



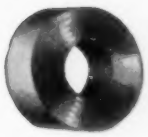
The servo unit comes in two sizes, 17 x 17 x 31 inches and 21 x 25 x 33 inches. The smaller size weighs 165 lb, has a dry ice capacity of 50-70 lb, and has a temperature range of —100 to 200 degrees F. The larger model weighs 200 lb, has a dry ice capacity of 150 lb, and has a total temperature range of —100 F to 200 degrees F.

The companion test chamber is an insulated chamber in which tests are actually conducted. Attachment is by means of a simple fastening device which may be disconnected to permit the servo unit to be used as a source of conditioned air for other enclosures.

The chamber is available in three sizes. The chamber has a stainless steel liner, a door equipped with a multi-pane inspection window, and can be installed so that the door will hinge upward or to one side. **T-3-1491**

The low cost way

from coil stock . . .



to flat stock . . .

for flat blanks . . .

is through LITTELL straightening machines . . .

Thirteen medium and heavy duty models of Littell Straightening Machines straighten coil stock of all standard widths and thickness. No. 308 series straightens stock from a fraction of an inch to 8" wide, and from .018 to .065" thickness. No. 4 series straightens stock from a fraction of an inch up to 12" wide, and from .065 to .125" thick. Variable speed transmissions are adjustable to the requirements of presses, shears or slitters.

WRITE FOR CATALOG

F. J. LITTELL MACHINE CO.

Speed with Safety

ROLL FEEDS • DIAL FEEDS
STRAIGHTENING MACHINES
REELS • AIR BLAST VALVES
District Offices: Detroit, Cleveland

4199 N. RAVENSWOOD AVE., CHICAGO 13, ILL.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-149-1

CHECK WITHIN .0001" WITHOUT EXPERIENCE

1. Use at machine without previous experience.
2. Has operator appeal; they will want to use it.
3. Instantaneous high point reading; no rocking required.
4. Shockproof; no lost accuracy; there is no gage like it.
5. Available in numerous modifications for almost any type of check.

Ask for Catalog D.S.

NILCO

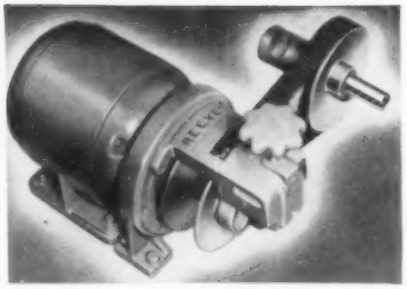
NILSSON GAGE CO., INC.
Poughkeepsie New York

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-149-2

Variable Speed Drive

The Reeves Flexispeed Drive for ½, ¾ and 1 hp applications has an 8 to 1 speed range.

The versatility of this drive, the ease of installation, the many possible locations of the handwheel and variable speed disc assembly, the appearance and sturdiness adapt it for many applications. The handwheel can be located in a position parallel to the motor shaft, or it can be located in any of 8 positions perpendicular to the motor shaft. The variable speed shaft can be anywhere in the 360 degrees around the motor shaft; the shafts can be vertical or horizontal. Mounting of the control takes little more floor space than the motor itself.



Basically, the drive consists of Vari-Speed motor pulley disc assemblies. The belt is double cogged to give the most flexibility for operating over small diameters. This molded belt, constructed of synthetic cord and synthetic rubber, is available in six different pitch lengths.

For further information, write Reeves Pulley Co., Columbus, Ind. **T-3-1501**

STAR PERFORMERS OF VARIED DESIGN . . .

★ With a single purpose . . . cool operating glare free light for every industrial need.
FLEXIBILITY wherever your lighting need calls for flexible adjustment —Model 16—3G24
RIGID ARM for extra stability on bench or machine —Model 16-9-913E, also available with side mount.
CONVERTING old fixtures into modern lighting. The famous Lite-Mite screw-in bulb—Model 16-2E.
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HAND VIEWER
portable with magnification Model 15-0.
HAND LITE—Model 16-12.

ADVANTAGES OF *Lite-Mite* FLUORESCENT LIGHTING:

Better product—By means of intense illumination. Faster production—Using time spent for "Time For Seeing" on production. Less fumbling—Improvement in depth perception. Lower cost per unit—More time on producing the quality product. Improved working conditions—Decrease labor turnover. Prevention of accidents and waste.

Write for complete catalog.

Stocker & Yale INCORPORATED MARBLEHEAD, MASSACHUSETTS

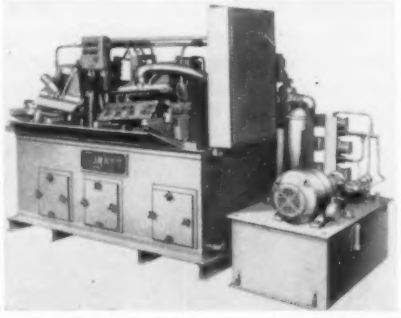
FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-150

Flush-Out Machine

A multiple cylinder head flush-out machine for testing and washing sand and chips from semi-machine cylinder heads has been designed by Turner Bros., Inc., 2625 Hilton Road, Ferndale, Mich.

The cylinder head is placed in one side of the machine, tripping limit switches. When the operator presses a button, the fixture closes, and water pressure is automatically applied to the fixture and forced into all unsealed openings in the cylinder head.

A high-pressure water system is utilized, flushing through all cylinder head cavities for wash purposes. It is stated that the water pressure is equal to a 3-inch stream forced 90 feet into the air.



A relatively high speed is achieved since the operator is able to load and unload other fixtures onto the machine during the sequence of operation. Starting and stopping buttons are palm type for operator's greater safety.

T-3-1502

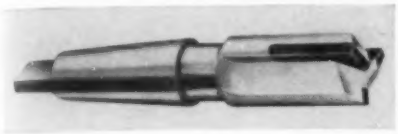
Small Gear Pump

A line of gear pumps from 1/25 to ½ hp has ben introduced by Graymills Corp., Chicago. Three basic pump sizes are offered for fluid delivery: 1, 2 and 3 gpm. Motor sizes are 1/25, ¼, ⅛ and ½ hp, with pressures to 100 psi.

They are designed for coolants, oils, solvents, emulsions; for machine tools, circulating systems, small sprayers, etc. Pump units are self-priming, directly connected to face mounted motors. Relief valve, inlet filter, and various mounting flanges are optional. Pumps are mounted vertically, either immersed in shallow tanks or with inlet pipe dropped to the liquid. Many types of complete pump systems with tanks, hoses, fitting and filters are also available. **T-3-1503**

Penetrating End Mill

A three-fluted, center-cutting, carbide-tipped end mill has been added to the line of standard carbide tools of Super Tool Co., 21650 Hoover Road, Detroit 13.



This tool is capable of penetrating end cutting as well as routing, etc. It is useful in many places where the conventional carbide end mill cannot be used. The new tool is specially designed for nonferrous metals and nonmetallic materials, and is stocked in both straight shank and B&S taper shank in six sizes, 3/8 to 3/4 inch inclusive.

Addition of the above tool to their present stock of standard carbide end mills for routing, face milling and slab milling (2 flutes for Dural, aluminum, etc. in 2, 4 and 6 flutes for iron, brass, etc., and in 2 and 6 flute for machining steel) makes it easy for users of carbide to obtain quick delivery on desired end mills. **T-3-1511**

Vibrating Screen

A vibrating screen for the sizing and processing of ore, coal, chemicals, grain, rock and other bulk materials has been developed by Hewitt-Robins, Inc., 666 Glenbrook Rd., Stamford, Conn.

The screen will handle heavier loads than previous models. It is equipped with a heavier yoke and it is mounted on coil springs instead of leaf springs. The springs are encased in a neoprene rubber accordion-type boot to keep out sand, stones and other substances.

All units will have three-inch discharge lips. Both single and double-deck models will be available. The single-deck model is designed for easy conversion to two decks by the installation of skirtboards, screen cloth, a buckerup frame and discharge lip.

The screen, known as the Robins Vibrex, model MS, employs the circle throw principle, which gives two positive strokes with every revolution of the counterweights. These strokes bounce the material being screened out of and above the screen cloth. At the same time, a circular action is imparted to the particles, making them rotate as they progress across the deck. In this way they try themselves for size many times from different sides, assuring that undersized particles will pass through the deck openings, thus producing sharp and accurate sizing.

T-3-1512

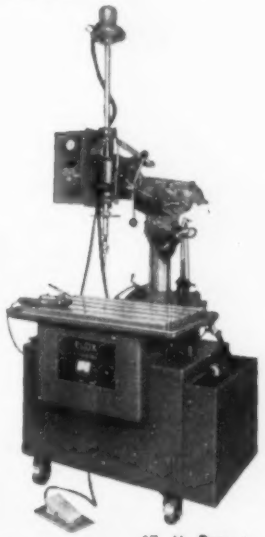
Broken Taps, Drills, Studs Removed Quickly, Economically With Any ELOX Electron Drill!

Actually salvage valuable parts for less than 25c, including labor, materials and burden.

ELECTRON DRILLING* . . . HOW IT WORKS

Electron Drilling* works as simply as your drill press works. The cutting tool is a hollow metal tube usually a copper alloy, which vibrates vertically. The cutting action is electronic disintegration of the metal. This is done without harm to thread or wall, without sticking or welding. A coolant is constantly being pumped through the hollow electrode and washes away the tiny particles of metal. Cuts any metal from diamond hard carbide to magnesium!

M-200 53½ pounds of trouble shooting. The smallest yet most efficient piece of portable equipment you could own. Can be carried and set up anywhere in your plant. $395 — F.O.B. Clawson, Michigan.



M-10 SALVAGE KING The fastest, most complete and modern machine of its kind built. Used where speed, production and precision count. Comes as illustrated. 25 M-10's are at work constantly in one of the largest automotive plants.

CHECK YOUR SCRAP TODAY! There's an Elox Electron Drill* priced to your requirements . . . and factory-trained men throughout the country. Write today for full details and list of users throughout the world.

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FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-151

FORMING FACTS

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80% INCREASE IN PRODUCTION!
UNIQUE BALANCE CO. INC.

Typical results by every user of

NILSON 4-SLIDE

Wire and Ribbon Metal
FORMING MACHINES

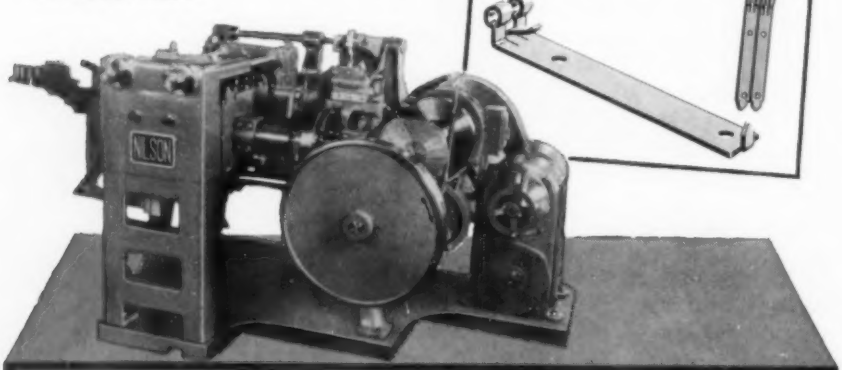
Plants from coast-to-coast are setting new production records with NILSON 4-SLIDE MACHINES . . . and experiencing tremendous economies and greatly improved quality.

Are you confronted with a keen competitive situation? Take the advice of hundreds of plant supervisors . . . install NILSON MACHINES and enjoy these economies *at once.*

NILSON combination press and 4-SLIDE forming machines take the stock directly from the coil — feed, straighten, pierce, blank, swage, stamp, coin — perform up to 5 forming operations and cut off . . . all in one quick, precise operation AUTOMATICALLY!

USING A NILSON COMBINATION PRESS AND 4-SLIDE FORMING MACHINE

Unique Balance Co., Inc. (one of the largest manufacturers of sash balance equipment), now produces 71,532 more parts out of the same amount of steel, compared to their former method. Production speeds increased from 100 to 180 pieces per minute.



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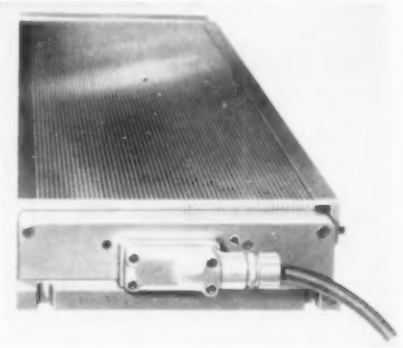
Automatic Chain-Making Machines • Automatic Staple Forming Machines • Wire and Stock Reels • Foot Presses • Wire Straightening Equipment • Slide Feeds for Presses

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-152

Multiple Pole Chuck

A magnetic chuck featuring multiple poles for full work surface holding area has been announced by the Sundstrand Magnetic Products Co., Division of Sundstrand Machine Tool Co., Rockford, Ill.



This Sundstrand Power Grip chuck has closely spaced separators which are of 0.050 inch wide brass separated by a ⅛-inch wide mild steel spacer. The 100-percent silver brazed construction results in a very rigid base for precision grinding.

Advanced design of these chucks and the efficiency of the low voltage winding gives uniform holding power over the entire face of the chuck. The full work surface holding area is ideal for holding large quantities of small, thin parts having small areas of contact with the chuck. **T-3-1521**

Friction Saw Control

An improved method of operation for their larger friction saws is announced by Kling Bros. Engineering Works, Chicago. Push-button control is now available for these saws on a central control stand.

All operations and feed adjustments are at the finger tips of the operator. When a button is pressed, coolant water is automatically sprayed on the saw blade while the carriage moves the blade toward the work. The water is automatically shut off when a forward limit switch is struck, after the material has been cut. The same limit switch also causes the carriage to return to its original position. Safety buttons for stop and reverse are provided.

The control stand is equipped with valves that adjust the feed pressure and the speed of the saw carriage. These adjustments were previously made at the side of the friction saw proper. It is claimed that this control will save many hours of labor that were formerly required in adjusting speeds and feeds of the saw carriage, and the possibility of running the saw without water has also been eliminated. **T-3-1522**

since 1931

EFFICIENT USE OF ENGINEERING MANPOWER

There is a sound reason behind the enormous growth of America's independent engineering industry.

Led by Pioneer since the 1930's, the industry has not only made possible more effective and efficient use of America's engineering manpower, but it also brings each day new blood, new ideas, new and better techniques to America's industrial plants.

With Pioneer as its leader it has become the key to America's constantly expanding "production know-how".

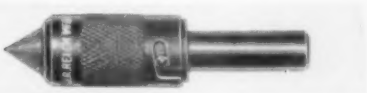
Pioneer ENGINEERING & MANUFACTURING CO., INC.

19645 JOHN R STREET
DETROIT 3, MICHIGAN

INDICATE A-3-153-1

Lapping Tool

These tools save time and speed up production because the abrasive cloth cone which fits over the mandrel can be quickly changed while the Cent-R-Lap is still locked in the chuck, it is



claimed. A twist will replace the worn cone. Diamond dressing and dust are eliminated. The cones are formed with a curved seam which assures accurate lapping without chatter. The accurately machined mandrel has a permanent 60-degree angle. Cent-R-Lap tools with non-rusting blue-black finish are offered in $\frac{3}{8}$ and $\frac{3}{4}$-inch sizes. Abrasive cones are available in all leading grits and sold in 100 lots. For information write to The J. R. Reich Mfg. Co., Dept. A, 45 E. Stroop Rd., Dayton 9, Ohio.

T-3-1531

Soldering Iron

Wall Mfg. Co., Grove City, Pa., has introduced an instant heat gun type of soldering iron without the use of a transformer which the company claims makes soldering more accurate, more economical and more efficient.

The Trig-R-Heat soldering iron has a light, plastic gun-grip which makes it easy to handle and aim. Heat is quick, reaching working temperature within a few seconds after the trigger control is touched. Heat-control thermostatic action prevents iron from getting too cool for efficient soldering, or too hot for tip safety. As a result, the tip lasts much longer, and gives more efficient service. This thermostatic action is guaranteed for the life of the iron.

A switch-controlled spotlight makes interior soldering easier. The soldering irons cause no radionic interference when in use. The iron operates on ordinary current, 115-120 volts, ac or dc. Wattage starts at approximately 400, and idles at about 100. **T-3-1532**

USE READER SERVICE CARD ON PAGE 133 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

since 1931

AVAILABLE:- HIGH CALIBRE PRODUCTION ENGINEERS

Pioneer has been able to attract and hold the highest calibre production engineers by eliminating the high peaks and deep valleys of employment, substituting variety for repetitiousness, challenges for stagnation.

This is a major reason why Pioneer can so consistently cut both cost and time of re-tooling, improve product designs for easier, lower-cost manufacture and devise new techniques that lower the break-even point.

Pioneer ENGINEERING & MANUFACTURING CO., INC.

19645 JOHN R STREET
DETROIT 3, MICHIGAN

INDICATE A-3-153-2

Material Handling Trays

Custom engineered material handling trays, fabricated from sheet rubber-base thermoplastic are now being produced by Jered Engineering & Mfg. Co., 19808 W. Eight Mile Rd., Detroit 35.

Trays are being fabricated to handle quantities ranging from a single piece to 300 units or more. Former trays for comparable jobs normally weighed four times as much. Supports and dividers can be formed integral with the tray, avoiding costly and perishable elements. Because supports can be built in, many trays are also used as assembly fixtures.

A variety of colors facilitates tray identification in production and inventory control. The low setup cost makes short runs economically possible. Tooling costs run from 2 to 10 percent of conventional forming equipment.

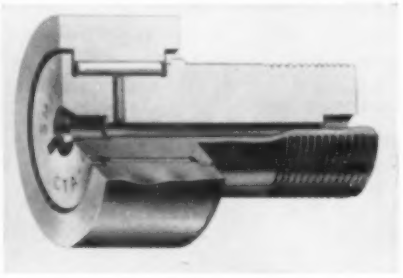
U. S. Royalite or Boltaron are used in the fabrication of these trays because of their many properties. Trays are light in weight, stainproof, grease-proof, mildew-proof, vermin-proof and shatterproof. Inasmuch as the material consists of forty percent rubber, the items are given toughness, long-wearing properties and inherent resistance to corrosion and attack by most industrial solutions and compounds. Trays loaded with precision parts can be dropped without damage, due to the shock-absorbing properties of the material. In addition, the trays are attractive and easy to clean.

Bulletin SP-500 is available upon request.

T-3-1541

Cam Follower Roller

Designed to meet heavy duty requirements, this type CTA cam follower roller has the advantage of a stud that is up to 100 percent greater in diameter, in relation to the size of the roller, than the stud found in other cam



followers. Because of integral flange on the stud, it is possible to increase the stud diameter to this extent. This assures the high strength demanded in special applications where high speed and heavy load-carrying capacity are essential for most efficient operation. The diameter of the stud can be specified larger or smaller to fit the need other than standard.

The stud is case hardened in the bearing section, but left soft on the threaded end to prevent snapping under impact or pressure. Threads are precision machined to assure proper fit of the nut. Made by Smith Bearing Co., 24 Bear Tavern Road, W. Trenton, N.J.

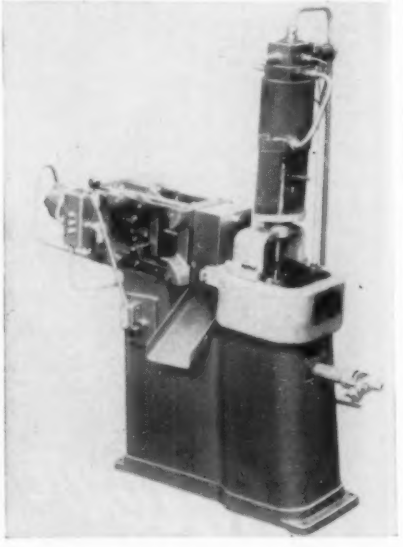
T-3-1542

Die Casting Machine

High-speed, high-pressure injection is featured on the latest model one-lb zinc alloy die casting machine offered by DCMT Sales Corp., 164 Duane St., New York 13.

The IMP/96 machine contains an injection system of the impact type whereby the piston area for injection is much larger than the area for piston return. This results in high-speed injection with no cushioning effect from the air trapped underneath the piston.

In order to secure the greatest advantages from this type injection, the main valve is a pilot-operated type, so that no throttling effect is undergone by the air going into the injection cylinder.



All of the basic advantages of DCMT diecasters, such as fast chilling, high cycling and automatic ejection of finished parts have been retained in this machine, so that production runs of 800 to 1000 shots per hour can readily be obtained. One of the features of the machine is that it is designed to use small prefabricated die blocks, which are completely machined, except for the cavity itself. The use of these die blocks enables manufacturers to use single cavity dies for their small parts, resulting in savings in die costs.

T-3-1543

MORE ROLLER BEARINGS PER MINUTE—

with a

SYNTRON

PARTS FEEDER

Automatic — Oriented Single Line Feeding

Syntron EB-O Parts Feeder feeding roller bearings to a centerless grinder.

Provide fully automatic, oriented, single line feeding of parts to automatic machines. Models available for parts of most shapes and materials. Electromagnetic operation, with finger-tip control.

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SYNTRON COMPANY

340 Lexington Ave. **Homer City, Pa.**

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-154

Leak Check Stand

A hydrostatic leak check stand has been developed by Planet Products Corp., 6305 Warrick St., Cincinnati 27, Ohio. This unit was designed to test for leaks in small castings and intersected passages in a variety of parts. Hand-pumped pressures up to 1000 psi are available; volume per stroke is approximately one cu in.

A poppet-type four-way valve is used to make possible evacuating a cavity as well as filling it. In addition, a needle valve is used to insure holding pressures over long periods of time. Quick connective couplings are standard; adapters, usually O-ring sealed, are designed to suit specific applications.

A compartment is provided as part of the unit to store adapters. Pressure is obtained from an aircraft-type hand pump which is supplied from a five-gallon reservoir built into the bottom of the unit; an access door at the rear makes cleaning and refilling simple.

Various size units can be supplied, either hand-operated or motorized, to suit a large variety of conditions.

T-3-1551

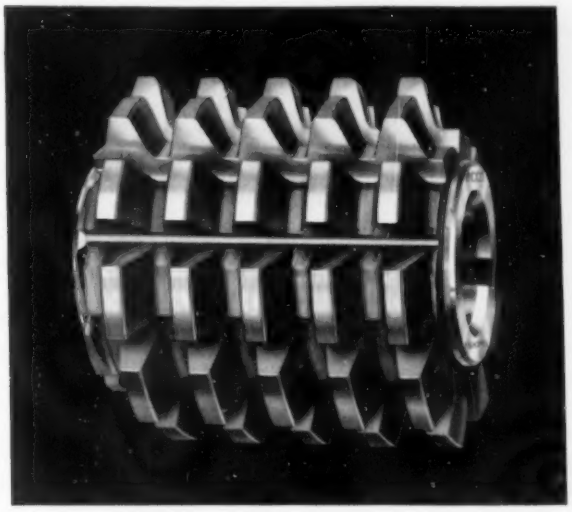
Sand Blast Hose

A sand blast hose, 15 percent lighter and 100 percent more flexible is announced by The B. F. Goodrich Co., Akron, Ohio. The Highflex hose reduces worker fatigue, increases output and is built for all-around sand blast service, according to the company. Catalog available on request lists tips for doubling hose life, describes materials and methods used in the manufacture of the hose and lists specifications.

T-3-1552

Accurate Unground Hobs

REDUCE TOOL COSTS



For Semi-Finish Hobbing

Since Accurate Unground hobs cost considerably less than ground hobs, they should be applied whenever job requirements permit. Class C Accurate Unground hobs are used primarily on pre-shaved gears. Many users consider the gears produced by these hobs to be sufficiently accurate for efficient operation of the shaving cutter. Special features, such as the ramp for cutting the chamfer and the protuberance for producing undercut, can be held to sufficiently close tolerances to satisfy the requirements of most gears.

For increased production of pre-shaved gears, multiple-thread Accurate Unground hobs are often used. The increased production of the multiple thread feature and the reduced tool cost of the Accurate Unground hob have provided exceptional savings on many jobs.

For Finish Hobbing

Accurate Unground hobs are also used for some *finish* hobbing jobs, although they are not as consistently accurate as ground hobs. Consequently, they are used for finishing jobs which do not require the consistently closer tolerances of ground hobs. In addition to the saving in tool cost, Accurate Unground hobs often have a greater tool life than those with a ground form.

To determine the advisability of adapting Accurate Unground hobs to your jobs, consult your nearest Barber-Colman representative. He will be glad to help you with any of your gear problems.

FOR ACCURACY SELECTION — *Send for Copy of New Hob Standard Tolerances*

Barber-Colman Company

BARBER COLMAN

GENERAL OFFICES AND PLANT, 7103 ROCK STREET, ROCKFORD, ILLINOIS

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-155

Cutter Grinder

An improved, vibration-free cutter grinder, model CG2, has been placed on the market by New Hermes Engraving Machine Corp. It is designed to grind cutters from any type of engraving or routing machine.

A feature of this cutter grinder is a precision ball bearing spindle driven by a smooth, endless belt. This permits a vibrationless grinding wheel which guarantees a keen and smooth cutting edge.

The manufacturer claims that this grinder has been designed in the most compact form. It can be mounted on the workbench next to the engraving machine, thus effecting saving in operational time and reducing need for space.

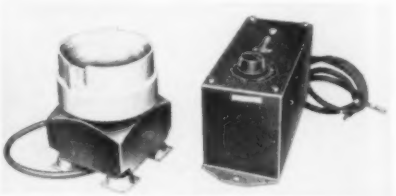
The tool head is designed for spring collets and has a capacity of ½-inch diameter shank cutters. It is equipped with an indexing device for grinding single lip, 2, 3, and 4-sided cutters.

It is pointed out that this grinder is so simple to operate that any inexperienced operator will be able to grind cutters concentric with any desired profile and proper clearance.

Detailed information may be obtained from New Hermes Engraving Machine Corp., 13-19 University Place, New York 3. **T-3-1560**

Parts Feeders

Syntron Co., 340 Lexington Ave, Homer City, Pa., has added a small model, the EB-00 to its line of vertical vibratory parts feeders.



Syntron parts feeders are designed to handle various sized and shaped pieces and parts, aligning and positioning them as desired and dispensing them one at a time to packaging, machining, assembling and other processes.

This small model EB-00 furnished complete with cast aluminum or sheet steel bowl and separate controller lowers and minimum part length and diameter that can be handled from 1¼ x ¼-inch diameter to ½ x 3/16-inch diameter greatly enlarging the number of parts that can be handled. Its small size also permits its adaptability as an integral part of complete processing devices. Literature is available from the manufacturer. **T-3-1561**

Diamond Tools

An improved line of diamond tools featuring rustproof holders is now available from Diamonds and Tools, Inc., 19345 John R St., Detroit 3. All toolholders in the line are surfaced with an oxide coating that resists corrosion, thereby avoiding rust which occurs on conventional uncoated holders when held in stock or subjected to the action of corrosive coolants. Thus the shanks of the tools retain their size and fit in diamond dressing equipment throughout their useful life.

Diamonds in tools are set in the holders with a special Colmonoy alloy. This alloy has a low melting temperature, excellent thermal conductivity, extreme wear resistance and has the additional advantage of an extremely low co-efficient of expansion which approximates that of a diamond. These properties assure a permanent, secure diamond setting. The diamonds are set in the holder under heat and pressure without flux in a neutral atmosphere to further assure a nonporous secure mechanical bond of Colmonoy alloy between the diamond and holder.

T-3-1562

KNIGHT'S

Power Feed ROTARY TABLES

fast, low-cost ROTARY MILLING & INDEXING on any milling machine!

- Completely Self-Contained Motor-Driven Units
- No Set-Up Time — Just Plug Into Any Electric Outlet

Can be used on any milling machine without additional or special equipment. Set-up time is completely eliminated.

Use them for Automatic Cycle Milling . . . Cam Milling . . . Face Milling . . . as an Automatic Revolving Fixture . . . and for other special work to save costly time and labor.

20" Model: 18 quick-feed changes, 1½" to 52", or 3" to 108".

42" Model: Infinite variable feed. Automatic positioning. Table can be increased to 72" with subplates.

Mail Coupon For Brochure

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3928 W. Pine Blvd., St. Louis 8, Mo.

Send information on Power-Feed Rotary Tables

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☐ Also send details on Knight Milling Machines

KNIGHT VERSATILE MILLERS ACCURATE RIGID

W. B. KNIGHT MACHINERY CO.
3928 WEST PINE BOULEVARD
ST. LOUIS 8, MISSOURI

FOR FURTHER INFORMATION, SEE READERS SERVICE CARD; INDICATE A-3-156

Electronic Counter

A high-speed predetermined electronic counter employing an all cold cathode tube design has been announced by the Haledy Electronics Co., 57 Williams St., New York City 5.

Simple to operate, these counters are able to produce easy-to-read output information on large illuminated numerals for direct panel readouts without any interpolations or additions for any digit it is claimed. Requiring no warm-up time, and ready for instantaneous operation, these counters are able to operate at any selected count for application to machines or processes requiring the exact measurement and control of frequency, quantity, length, time, velocity and revolution. They are available for single, dual or multiple sequencing.

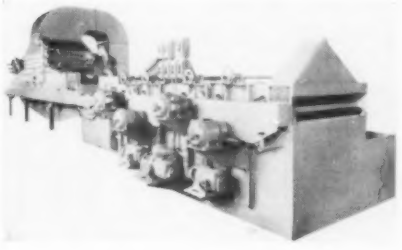
Employing cold cathode counting tubes which do not require either filament transformer or high voltage power supply, there is no danger of continual tube burnouts and failure. Haledy TT-1 tubes have a minimum life expectancy of ten years in operation, assuring these counters of long life, low power consumption and maintenance free operation. Operating on control ratings up to 15,000 per minute, they are able to produce output information at any predetermined count without tube or wiring adjustments of any sort.

Preset decimal counting decades have been designed so that each counter tube functions as a direct readout number, while predetermined counts are selected by dial switches on the facing panel. When the predetermined number of counts has been registered the unit actuates a control relay whose action may be utilized to perform any given function. The counter is able to reset automatically and instantaneously without loss of a single count, while recycling may be either manual or automatic. The circuitry is independent of line voltage fluctuations and variations.

The counters are built with various outputs as well as input circuits and are available in different predetermined count capacities. Designs are limited to ten digits and six sequential preset count settings and will predetermine any number of selected counts occuring in sequence. **T-3-1571**

Sheet Lubricator

A machine designed for the application of lubricants to sheets and blanks is announced by Gilron Products Co. This automatic machine combines with the unique advantages of Drawcote, the company's dry lubricant, to reduce stock preparation costs and speed production in many metal-forming operations. Material can be processed through this machine at speeds up to 55 feet per minute. Three separate operations are performed. Sheets or blanks to be coated enter the washer unit. Here rotary brushes clean the stock with an alkaline cleaner. Operation of brushes on both top and bottom of material during wash and rinse stages is said to assure fast, positive cleaning.



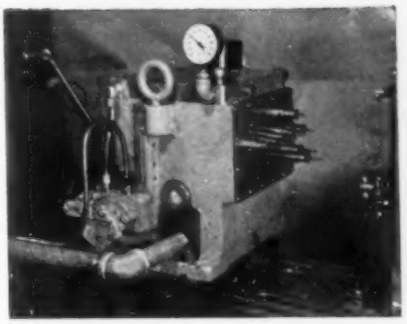
Cleaned stock then enters the self-contained coating unit where it is handled in a horizontal position for easy loading and stacking. The steam-heated, fully enclosed solution tanks can handle blanks up to 48 inches in width. The manufacturer states that this unit assures even, sure coating for maximum drawing compound economy.

After coating, the stock enters the drying element which is available with steam, gas or electrically heated ovens. It is claimed that this dry coated material is clean and easy to handle, that it can be safely stored for long periods and then formed with no need of additional lubricant.

Information is available from Gilron Products Co., 6007 Euclid Ave., Cleveland 3. **T-3-1572**

Honing Stone

This honing stone is said to be tough and resilient and cuts without scratching. It may be drilled and tapped. Used with kerosene or water, it does not fill. It is made in ½ inch sq x 7 inches long in grits of 120-220-320-400-600-800-1200 and 1600. Manufactured by Scientific Abrasives, 5100 North Canfield Rd., Chicago 31. **T-3-1573**



An ultra precision multi-spindle head of a unique design adaptable to an Excello, Heald or Stoker-Unit Horizontal-Precision Boring Machine.

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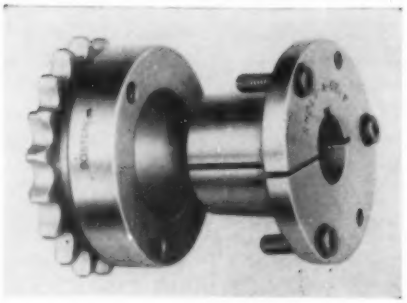
INDICATE A-3-157

Shold-A-Grip Bushings and Sprockets

The Boston Gear Works, 14 Hayward St., Quincy, Mass., has announced an interchangeable split tapered bushing, designed principally for use with sprockets. This bushing makes it possible to use the same size Boston sprockets on shafts from ½ to 1½ inches in diameter in steps of 1/16 inch. This eliminates the need to rebore stock sprockets to fit particular shafts, thus saving the time and cost of reboring, keyseating and tapping for setscrews.

The bushing is drawn into the tapered hole in the sprocket by tightening



cap screws. Since both the ID and the OD of the bushing and the bore of the sprocket are ground, the bushing grips both the sprocket and the shaft with the equivalent of a press fit, even on shafts which are undersized as much as 0.005 inch.

The mating sprockets have a shoulder on the hub, allowing room between the teeth and the shoulder for chain clearance. Because the bushing is screwed to the shoulder, and because the diameter of the shoulder is not limited by chain clearance, the sprocket can be manufactured with a maximum size bore and minimum number of teeth.

The sprockets are available from stock in sizes from ½-inch pitch up to and including 1¼-inch pitch. Both bushing and sprocket are of machine steel and can be case hardened.

T-3-1581

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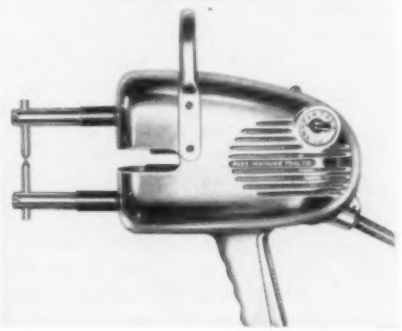
FOR FURTHER INFORMATION, SEE READERS SERVICE CARD; INDICATE A-3-158

Portable Spot Welder

A portable spot welder with built-in thyratron controlled timer switch is now being marketed. Any timing cycle from 1/60 second to a full second may be established by switch setting. All electronic controls and a transformer, suspended for quick heat dissipation, are contained in the polished aluminum housing; the weight is 26 pounds.



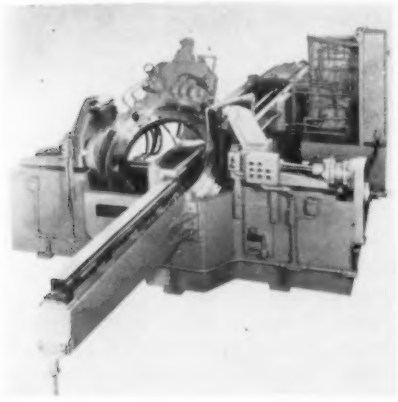
It is claimed that this portable tool will weld most alloys of aluminum sheets as well as mild, stainless, galvanized and cadmium plated steel and other metals, to a 3/16-inch combined thickness. Perfectly timed welds are made as fast as the operator can squeeze the pistol grip. The welder operates from 220-240-volt, 60-cycle ac. Electrode pressure to 1000 pounds and amperage over 12000 is developed at point of weld. Standard model has 7-inch throat depth and 3-inch opening. Additional throat depths up to 18 inches and special shaped arms and tips are available. A mounting stand which converts the portable unit to a foot-operated floor model for semi-production work, and adapters for quick changeover to water cooling are also offered. For further information write Ross Machine Tool Co., 7631 S. Ashland Ave., Chicago 20.

T-3-1582

USE READER SERVICE CARD ON PAGE 133 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

Trunnion Fixture

Versatility is said to be the feature of this special trunnion fixture equipped horizontal broaching machine for internal broaching. Indexing, the diameter of the work, and the angle of the cut can all be adapted to the requirements of the workpiece. The machine was developed by Colonial Broach Co., P.O. Box 37, Harper Station, Detroit 13.



The machine is basically a standard 10-ton, 90-inch stroke horizontal broaching machine. It incorporates a fixture which allows angular adjustment from 15 to 45 degrees for broaching a wide range of internal angular slots in jet engine segments of various diameters. Variation in diameters are accommodated by changing the internal support ring in the fixture.

An internally mounted rotor in the trunnion fixture is actuated by an index mechanism mounted on top of the fixture. This allows the workpiece to be advanced in accurate increments in accordance with the workpiece specifications. Angular adjustment is through a worm and segment, with positive locking. Indexing is hydraulically powered through change gears and a Geneva motion, controlled by limit switches, and locked in place by a positive plunger, providing versatility as to amount of index.

In operation, the ring segment is mounted in the fixture, the trunnion fixture is horizontally shuttled into broaching position, the broach cuts a slot. The fixture recedes from broach cut, the broach is returned, and the part is indexed one increment. The fixture then returns to broaching position, and the process is repeated automatically until all slots are broached. The rapid traverse then rotates the part automatically to loading and unloading position. The part is ejected pneumatically. Selective electrical circuits are provided for fully automatic operation, single indexing, or independent inching motions for all hydraulic units, including both forward and reverse.

The machine is constructed so that it may be shipped in three separate subassemblies, and assembled in the production shop. Forced feed lubrication supplies lubricant at each pass of the ram. **T-3-1591**

Lead Measuring Device

A universal lead measuring instrument is manufactured by The Sheffield Corp., Dayton 1, Ohio. It accurately determines the lead of internal and external threads of work parts up to 8 inches in diameter and 18 inches in length.

The base supports a fixed headstock at the right end, with a tailstock at the other. The head stock, besides mounting the centers, carries what is virtually the barrel of a specifically constructed micrometer. The tail stock can be used in either of the two runways to accommodate work of various diameters, and may be locked in any position.

The longitudinal carriage runs on balls on hardened and ground ways and supports the specially constructed totally enclosed micrometer nut. A weight insures that the thrust is always in the same direction. On this, another carriage which supports the amplifying and indicating unit (magnification 400-1) is mounted and can be traversed longitudinally and locked in any desired position. The stylus holder can be rotated to suit various setups and a spring loading device permits a suitable pressure between the stylus and the work. The 40 T.P.I. micrometer screw has a working travel of two inches and any small residual lead errors which may be present are corrected by a compensating attachment.

The machine can be supplied with an attachment for measuring the lead of taper threads up to an included taper of 1 in 4 on the diameter. The taper unit consists of a block incorporating a centrally pivoted sine bar and setting is performed by means of an adjustable knurled screw against a graduated scale. **T-3-1592**

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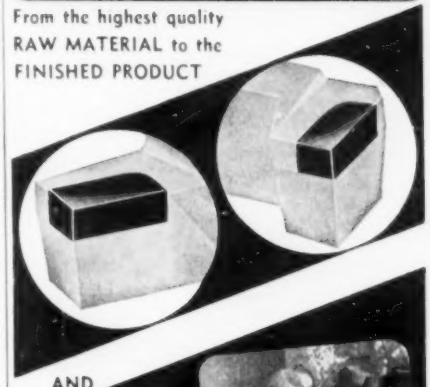

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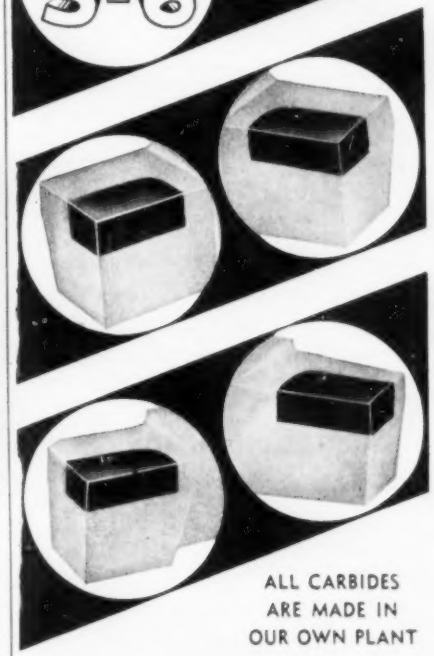

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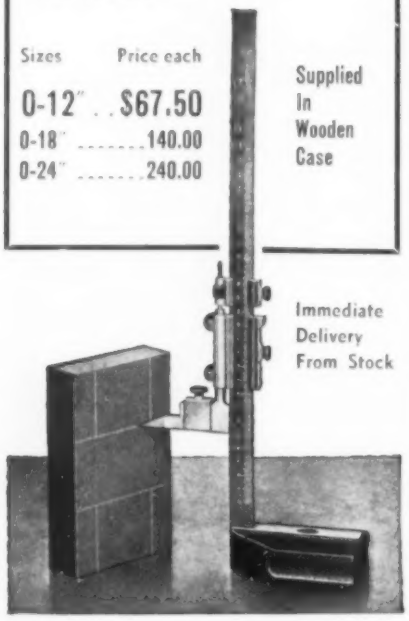

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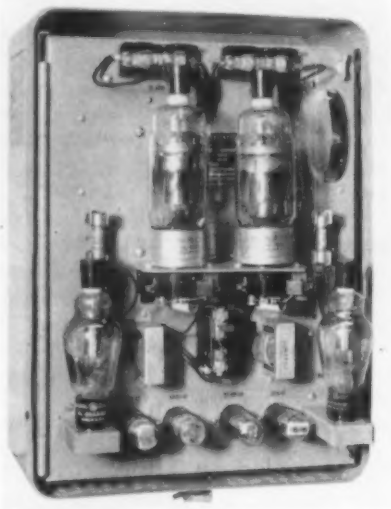
INDICATE A-3-160

Adjustable Speed Drive

A simplified addition to its broad line of Thy-mo-trol ® packaged electronic adjustable-speed drives has been announced by the General Electric Company's control department.



Designed for use on many types of equipment, including testing machines, printing presses, conveyors, variable-volume or proportioning pumps, and machine tools, the new unit is available for ¾ to 3 hp drives. It offers stepless speed control, preset speed control, and close speed regulation, and includes the smallest Thy-mo-trol drive panel, measuring 15 x 18 x 12½ inches.

The electronic drive is offered in standard speed ranges of 5:1 and 20:1 and comes in both reversing and non-reversing forms. It features dynamic braking and standard overload and undervoltage protection.

Selection of a wide range of speeds is accomplished by turning a single knob. The motor will accelerate to and hold any present speed within plus or minus three percent regardless of ordinary load changes.

The simplified system consists of an anode transformer, electronic control panel, control station, and d-c shunt-wound motor.

It operates on 220/440 volts, single-phase 50/60 cycles. Dual rating of the anode transformer makes it possible to use either voltage by merely changing primary connections. Special drives can be supplied to operate from other standard power supplies. **T-3-1601**

Lubricant

A lubricant for use at temperatures of 500 degrees and over, Hi-Temp oil 303 is light enough to be fogged easily in automatic lubricators yet provides high load carrying protection.

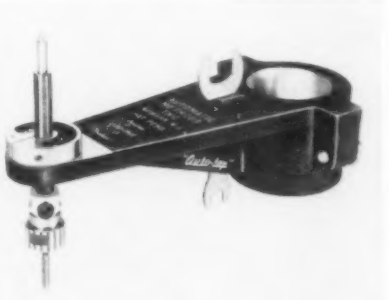
This hot-spot lubricant combines molybdenum disulphide with a synthetic base and a pure, low-carbon-content petroleum oil. These properties impart exceptional lubricity, high resistance to heat breakdown and reduce carbon build-up to a minimum on bearings exposed to elevated temperatures.

Another feature of Hi-Temp oil 303 is its high stability. This lubricant will not separate in storage, making it particularly well-suited for automatic spray or mist dispensing equipment.

For further information, write E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33.

An improved lead screw tapping attachment for use in a standard drill press, that will take the tapping load off the tap and leave the tap free for thread cutting only, is announced by Automatic Methods, Inc., Newark, N. J.

The manufacturer claims that the precision rolled thread lead screw, and adjustable split-nut in which it works, carries the driving load, whether applied by an unskilled operator or by other driving force, thereby taking the strain from the tap except that required for actually cutting the thread. This tapping attachment is designated the Auto-tap.



A new type of arm for attachment to standard drill presses has also been provided. This arm is aluminum cast in a pressure mold for utmost strength and precision; then the clamp is reamed for perfect fit.

The only tools needed for assembly of the Auto-tap to a drill press and for interchanging lead screws and split driving nuts when different pitches are used are two small wrenches, an open end and an Allen wrench. The arm has a slot and a hole provision for holding them to always be handy for use.

Taps are held in Jacobs Rubberflex collets and accommodate sizes from #0 to ¼ inch and #10 to 5/16 inch. The lead nut is adjustable to compensate for wear. Interchangeable lead screws and lead nuts are available in the following pitches: 20, 24, 38, 32, 36, 40, 44, 48, 56, 64, 72 and 80. Additional information will be furnished upon request to Automatic Methods, Inc., Div. 279, 42 Walnut St., Newark 2, N. J. **T-3-50**

Hand Torch

This torch is adapted for brazing, hard or soft glass working, tin smithing, cutting, lead burning, soldering, extreme light welding (18, 20, 22 gage), light alloy welding, as well as a tool for the electrical and electronics fields, according to the manufacturer.

The Flamemaster Mark 11 hand torch has quick action needle valves with conveniently placed thumb control for the gas and air or oxygen supplies. A built-in leakproof economizer cuts off the gas and air supplies when the operator's grip is relaxed and restores the flame when the torch is held in the hand. The same control enables a soft, warming up flame to be obtained by partial operation of the lever. The pilot flame is adjustable to suit different gas pressures. Five interchangeable flame units are available, providing flames of two to ten inches in length and various thicknesses.

The torch burns natural gas, butane or propane with compressed air or oxygen, or manufactured gases. It also burns hydrogen where needed.

Distributed by Tonea Hamilton & Associates, 5371 Wilshire Blvd., Los Angeles 36. **T-3-1611**

Locknut Pliers

Utica angle locknut pliers No. 750-8 do three special jobs for electricians. They tighten locknuts in outlet boxes; they remove burrs from steel tube or conduit; they cut and skin rubber-covered wire.

The pliers feature a roller jaw which rotates freely inside the standard outlet box locknut. The other jaw catches and turns the lug of the locknut. The result is tighter locknuts and bushings and a permanently grounded system.

Burrs on pipe are removed by twisting pipe between the roller jaw and the fixed jaw. The fixed jaw has two cutting edges which scrape off the excess metal. The angle locknut pliers also cut wire with the base of the jaw. They are additionally adapted to skinning rubber insulations between the roller and fixed jaws without damaging the wire itself.

T-3-1612

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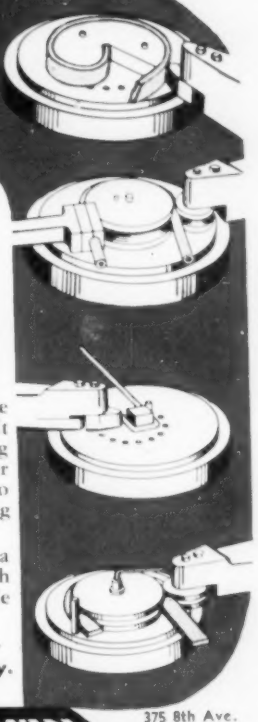

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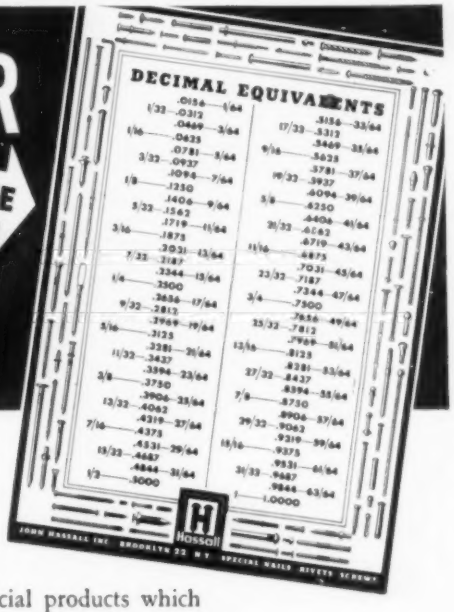

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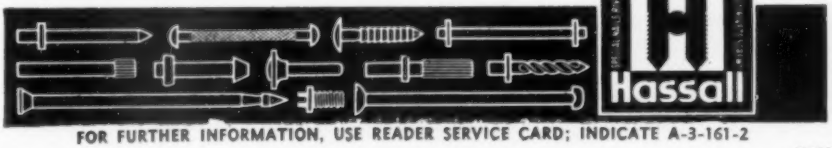

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#5 Table 20" x 90" **#6 Table 20" x 110"**

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Werner Millers in smaller sizes from 0 to 4 with table sizes from 6" x 20" up to 16" x 72" are also available

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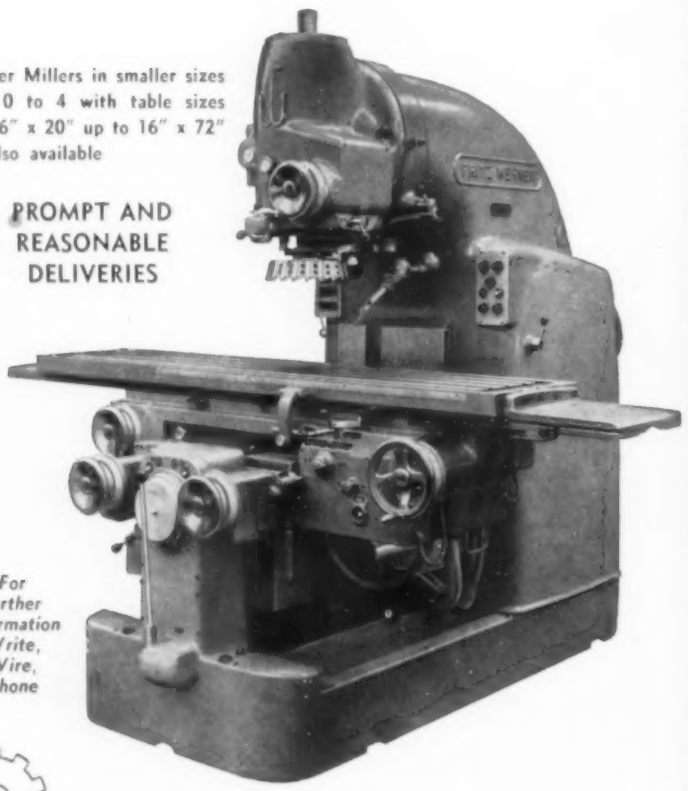

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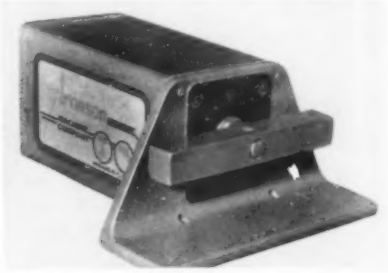
FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-162

Foot Control

Aronson Machine Co., Arcade, N. Y., announces model FPC foot power control, a reversing foot-operated toggle switch. The switch is made up of a drum switch encased in an indestructible steel enclosure that is dust-tight and oil-tight. Operation of the switch is simple and inadvertent operation is guarded against without detracting from the ease of operation. Hand manipulation is also accomplished as conveniently as a regular drum switch, thus providing dual-purpose control.



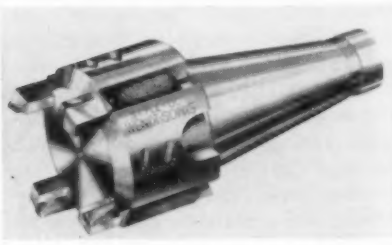
Assembly and disassembly is simple. There are no parts to fail or be damaged from rough treatment. The switch is relatively small and yet has adequate space for wiring. The three-pole switch has twelve terminals and will control single-phase, two-phase, three-phase and direct-current motors. The rating is ¾ hp ac and ⅛ hp for d-c motors. Action can be either nonspring return (maintained contact), or self-centering (momentary contact), changing from one to the other by relocation of one screw.

These switches were developed for welding positioner control and will prove adaptable for any motor control where fast, safe, foot operation is required under conditions of rough usage.

T-3-1621

Fly Cutter

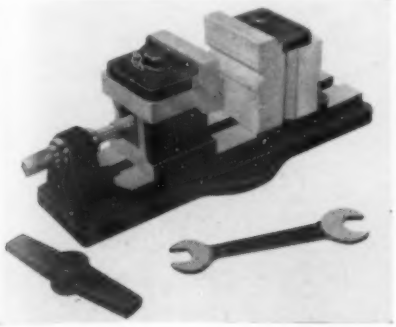
Universal fly cutters, manufactured by the Wendt-Sonis Co., Hannibal, Mo., can be used on present equipment. Body slots are milled and finish-ground to precision tolerances. Blades



are also ground on both locating sides to assure a minimum of total indicator runout when the tool is in operation. Sizes for the fly cutters range from 3 to 6 inches and they are available in 4 and 6 blade styles. **T-3-1622**

4-in-1 Vise

rown Engineering Co., Reading 2, P are offering a four-in-one vise that ces setup time, eliminates costly The Brown utility vise saves the required hunting for and adjust- clamps, bolts, washers, parallel ps, levels and squares ordinarily d in rigging work on drill presses,



millers, grinders, shapers and other machine tools. All parts necessary for clamping work securely and accurately are included in this one unit. Few adjustments are needed to clamp the work securely into position and accuracy is increased since wobble and play are eliminated.

The rear turret of the vise revolves, presenting four different faces for holding various kinds of work, including round, square, octagonal, rectangular, flat or angular-shaped pieces, vertically, horizontally, or at an angle. Auxiliary jaws at the top of each turret can be spread at an angle to hold odd-shaped work. Of heavy, rugged construction, the unit is used in manufacturing plants on productions and repair work. **T-3-1631**

HSS Band Saw

A high-speed steel band saw blade to provide more economical cutting of tough metals has been developed by the Henry G. Thompson & Son Co., New Haven, Conn. Made from a red-hardness high-speed steel, several types of Milford Rezistor band saw blades are designed primarily for production cut-off work and are particularly effective for cutting stainless steel.

The company states that not all of the current types of band saw machines are suited for use of this new high-speed steel blade. Therefore, this blade will be introduced on a rental-performance basis under the control of the Thompson Engineering staff until the design of more efficient machines makes possible the maximum performance of the Rezistor high-speed steel band saw blade. For the present, the sizes manufactured will be confined to ¾ and 1-inch widths with 6 teeth per inch, in tempers suitable for specific applications. **T-3-1632**

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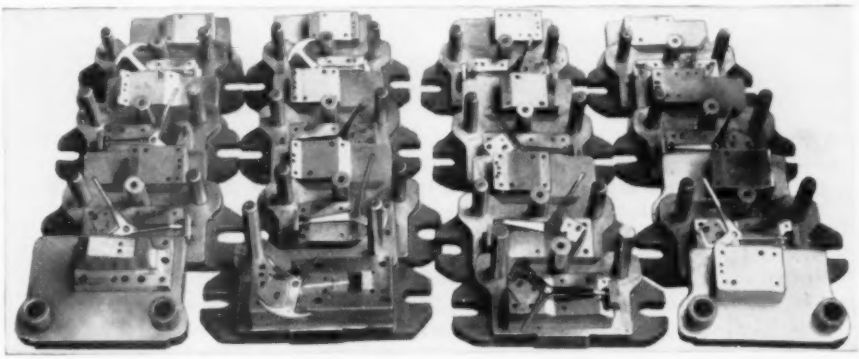
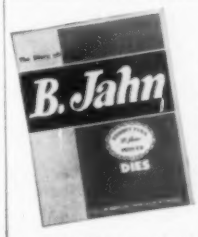
Modern production requires assemblies — each component demanding a separate tool and die — each having a vital relationship — all needed when you want them. In the modern B. Jahn plant, 165 skilled tool-makers representing 3654 years of experience *work together* developing multiple dies of flawless precision for intricate assemblies.



Part of a set of twenty-eight B. Jahn built precision forming dies, to produce different component levers for one of America's largest calculating machine manufacturers. B. Jahn builds multiple dies as a team — each engineered to do a specific job perfectly.

HERE'S THE WHOLE STORY -



Send TODAY for "The Story of B. Jahn Production Proved Dies" — a fact-packed brochure illustrating B. Jahn's facilities and their production-increasing, money saving applications.

Investigate B. Jahn and Invest in Production Economy!

B. Jahn

THE B. JAHN MANUFACTURING COMPANY, NEW BRITAIN, CONNECTICUT

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-163

Loadmeter

A device for controlling wear and limiting breakage of carbide tools has been put on the market by the Detroit Milling Cutter Co. Termed the Loadmeter, this instrument works on the ammeter principle to reflect motor capacity and percentage overloads, but incorporates features not available in an ordinary ammeter.

First, the Loadmeter is constructed with an auxiliary red pointer which can be set by the operator or by supervision at the point at which a tool is dull and should be changed. Industry has pretty well established that a dull tool pulls from 50 to 100 percent more power than a sharp one. The Loadmeter reduces this generality to pinpoint exactness for a particular tool on a specific job. The overload recorded when the tool is dull is first determined by visual inspection of the tool. The red hand is then seat at this point on the Loadmeter with instructions to change tools when the Loadmeter's black pointer reaches the red one.

Another advantage over an ordinary ammeter is the Loadmeter's wide range. It can be set for any motor ranging from 1 to 50 horsepower and the entire dial is then focused to that specific motor. At any time it can be sent back to the manufacturer for change to a motor of a different rating at a nominal charge. An aluminum plate is provided on the rear case showing the setting for voltage, horsepower and amperage.

An easy-to-read colored dial helps assure operator cooperation, the dial registering green when the machine is operating from zero to 100 percent of

rated motor capacity, yellow from 100 to 125 percent, pink from 125 to 150 percent and red above 150 percent.

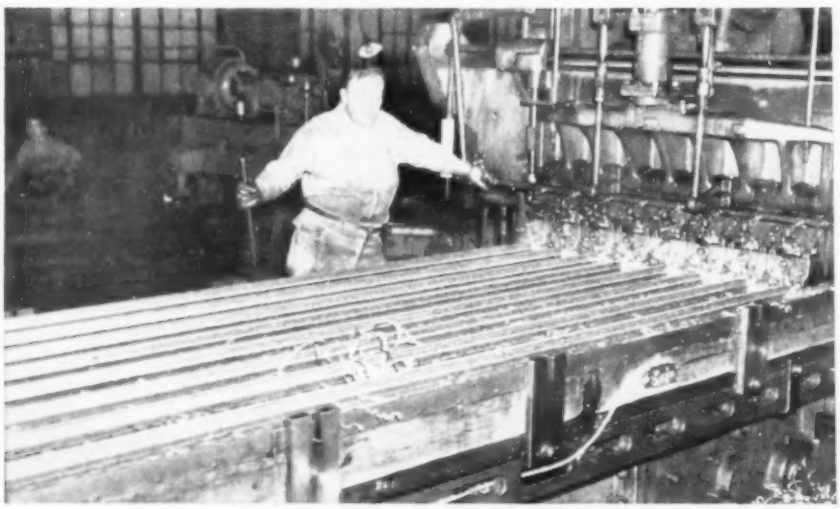
The initial starting surge of a machine pulls from three to five times the running amperage. While an ammeter selected for a given motor size could burn out under this starting load, the Loadmeter, through damping the current transformer, provides protection against this contingency.

On milling applications, particularly on shifting from high speed to carbide cutters, or where different jobs are being put across the same machine, the Loadmeter is invaluable in quickly establishing a feed rate within the machine power limitations. Past practice has been to roughly calculate the cubic inches per minute being removed at a given feed rate and use a K factor based on Brinell hardness to determine power required per cubic inch removal. This method ignored so many factors such as cutter lead angles, blade radii, hard inclusions, etc., that a smashed cutter was normally the price of determining the feed rate to use. The Loadmeter quickly and accurately eliminates the guesswork.

To facilitate mounting on the wide variety of machine tools for which it is adapted, the back of the case contains a mounting flange which can be rotated to either side or to top or bottom. Detroit Milling Cutter Co., 28625 Grand River, Farmingon, Mich.

T-3-1641

Walker Magnetic Chuck Reduces Production Time 50 Per Cent



The problem: Hold guide rails 8′ to 16′ long with small cross section; planed in units of eight, three tool bits per rail. Chuck must hold against twenty-four cutting edges, 90 sfpm, feed 0.060″. Close tolerance and finish necessary—tool bits and work pieces cannot be magnetized.

Solution: Walker engineers recommended a chuck installation 60″ x 198″ with ***balanced magnetic circuit*** essential to proper chip control. The holding power of this installation is more than 200 psi.

Result: Set-up simplified . . . danger of distortion minimized . . . ***two men*** now doing a planing job which formerly required ***three*** . . . production time per piece cut in half . . . work pieces have better and closer tolerances. Neither tools nor rails are magnetizd.

Walker Does It Again

O. S. WALKER CO. Inc.

WORCESTER 6, MASSACHUSETTS

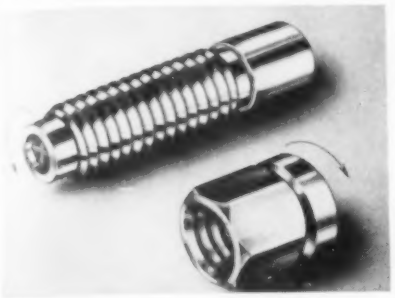
Original Designers and Builders of Magnetic Chucks

In Canada — Upton Bradeen & James, Ltd.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-164

Swivel Shoe Set

This swivel-shoe set recently developed by Allied Air Parts has many advantages over methods now used for holding tools and parts, it is claimed. The new sets are simple to use and are adaptable to any type of tool, jig or fixture. They provide positive holding without marring, scratching or



burring the held part. Their use eliminates the high cost of making shoes on the job and also the time-consuming job of mounting plates and fixture shoes so that home-made shoes can be properly mounted and riveted.

All parts of the Allied swivel-shoe set are machined to insure concentricity of shoe and pitch diameter of screw. They are now being used on drill jigs, mill fixtures, profile fixtures, shop tools, screw turrets, etc.

Two types are available: hexagon swivel (H-S series), adaptable to any type and length screw, and swivel set (S-S series), a socket-head screw with swivel shoe attached for use in tight quarters where movement is restricted. Both types are available in various sizes.

Further information can be obtained from Allied Air Parts, 662 No. Robertson Blvd., Los Angeles 46. **T-3-1651**

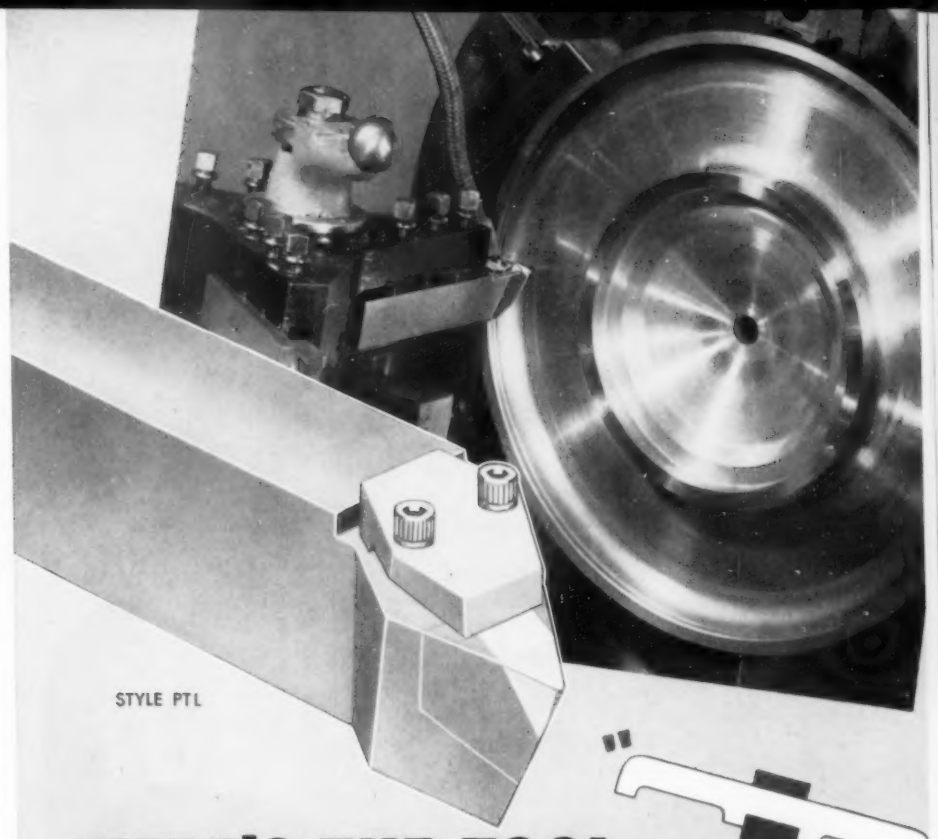
Hydraulic Pumps

These pumps and motors are suitable for either open or closed hydraulic circuits. They are particularly adapted to heavy machinery drives requiring precise control of torque, acceleration and deceleration, speed or reversal. Hydraulic motors in this series are outstanding for their ability to reverse quickly under full load, and to run at extremely slow speeds under full torque.

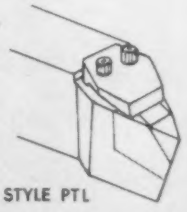
Applications include marine steering gears, winches and hoists, draw bridge lifts, extra large presses and machine tools, rotary machine drives, steel mill billet gougers and flying shears.

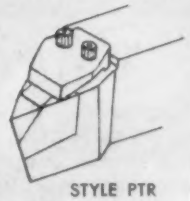
These units are available in ten sizes with capacities of 28 to 2300 gpm at rated speeds, and 50 to 4000 hp in the pressure range of 2000–3000 psi.

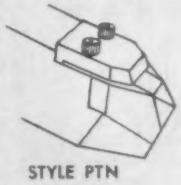
For additional information, write Waterbury Tool, Div. of Vickers Inc., Commercial Hydraulic Dept., Waterbury, Conn. **T-3-1652**



HERE'S THE TOOL *that fits to a* "







The right angle chucking lathe, tracer controlled, provides for efficient profile machining of workpieces having large diameter, short length, and thin wall sections, particularly those made of stainless steel and heat-resistant alloys.

To complete the set-up, an appropriate cutting tool is required. It must be shaped to accurately follow the lead of automatic control, face up to the job, and cut corners with maintained precision.

For this very purpose a Kennametal tool has been designed. The mechanically-held triangular insert, seated in a hardened V trough, provides a sturdy design in a 50° nose angle tool that will withstand lateral thrust, and can be modified to smaller nose angles and radii as required by specific profiling conditions.

Four shank sizes are available in three different styles — righthand, lefthand, and neutral, as illustrated in the sketches. See Catalog 52, page 45 for specifications. Confer with our Tool Engineers if you need help in this type of tooling—or any other. Kennametal Inc., Latrobe, Pa.

KENNAMETAL

CEMENTED CARBIDE TOOLING THAT INCREASES PRODUCTIVITY

27%

SAVINGS ACHIEVED WITH THIS STANDARD WENDT-SONIS TOOL

THE PROBLEM

A high speed steel drill 17/32" in diameter was being used to drill a cast iron hydraulic valve lift body, chilled on one end. This drill could be used approximately three hours before requiring resharpening. Such short tool life in itself resulted in high tool cost per finished unit.

THE SOLUTION

Art Grover of Grand Rapids Supply Co., Grand Rapids, Mich., supplied the solution. Art recommended a standard Wendt-Sonis carbide tipped drill, with a slight modification of the drill point which was done in the Company's own tool room. This drill was used for nearly twelve hours before dulling and produced approximately 18 more pieces per hour with overall saving of 27 per cent on the completed unit.

WENDT-SONIS WILL SAVE YOU MONEY

This is just one more example of the savings that can be made with Wendt-Sonis Standard carbide tools. It is interesting to note that about 84 per cent of all carbide requirements are covered by standard Wendt-Sonis tools available from your local Wendt-Sonis distributor's stock. He will be glad to help you select the right precision cutting tools that will cut production time and reduce tool costs.

NEW! 1953 ILLUSTRATED W-S CATALOG

Write today for the new Wendt-Sonis illustrated catalog, number 53. Contains complete details and specifications for the W-S line of standard carbide tools. You'll find this a helpful source for selection of the proper tool for every tool application.

WENDT SONIS

580 N. Prairie Ave.
Hawthorne, California

HANNIBAL, MISSOURI

549 W. Randolph St.
Chicago, Illinois

"THE MOST COMPLETE LINE OF CARBIDE CUTTING TOOLS"

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-166

Electrical Conduit

Sealtite flexible electrical conduit type UA is the first of its kind to gain Underwriters' Laboratories approval for use in wet locations, it is claimed. This liquid-tight flexible metal conduit is manufactured by The American Brass Co., Waterbury, Conn.

The tough, extruded synthetic covering over Sealtite type UA's flexible metal core protects wiring against moisture, oil, dirt, chemicals, and corrosive fumes on permanent and temporary installations. The conduit is made of spirally wound, interlocked zinc-plated steel strip with a copper bonding conductor wound spirally in the space between each convolution on the inside of the conduit.

Light and flexible, Sealtite type UA can be cut to required lengths and bends easily. Underwriters' approved fittings for use with Sealtite type UA are readily available. Where space is cramped and hard to get at, the conduit is easy to install. Applications of this moisture-proof conduit are suggested to overcome the problems of movement, vibration, misalignment, both indoors and outdoors. It is available in long lengths in nominal electrical ID sizes $\frac{3}{8}$ to $1\frac{1}{4}$ inches inclusive. **T-3-1661**

Height Gage

Recently introduced by the H. E. Dickerman Mfg. Co., Springfield, Mass., is a height gage. Incorporating design features which make it quickly adaptable for use as a height gage, comparator or scriber, this gage is available in column lengths of 18 and 24 inches. Greater post diameter and flanged base contribute to accuracy and stability in sustained gaging, inspection, or quality control operations. All gages are packed in hardwood cases. **T-3-1662**

Safety Press

Featuring increased impact, cleaner sign, and mechanical simplifications, Winter model RR-7 controlled-power safety press is now available. This punch-type air and spring powered press is finding wide acceptance for light staking, assembly and marking operations where high speed of operation, precise control of power, and the ultimate in operator safety are considered important by management, it is claimed.

Features of the press are: continuous hairline adjustability of impact from 0 to 12,000 lb. and of squeeze up to 12 times air-line pressure. A pedal release, or two-hand safety release, can be used. The regular Winter model 300 slide feed and the small-parts tray will fit the model RR-7.

Tools can be changed rapidly to reduce down time. When used with the air-operated slide feed, the operator's hands never approach the danger area in the neighborhood of the tool. The potential speed of the press is in excess of 100 strokes per minute. The absence of rebound makes it suitable for delicate marking operations, and the reduction in operator fatigue plus the safety features give the press an advantage over kick presses.

For literature write to Winter Products, Inc., Box 3112, Barnum Station, Bridgeport 5, Conn. **T-3-1671**

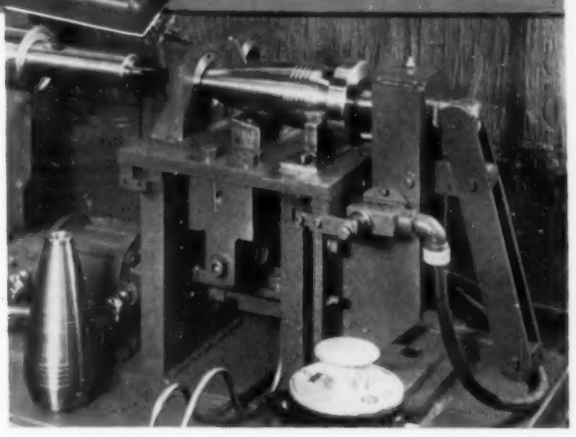
USE READER SERVICE CARD ON PAGE 133 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

450 pcs. per hour!

Taps .800-16 in 81M Smoke Shell—7/8" STROKE

Another Cleveland Design to Speed Production!

MODEL E-2 HORIZONTAL



Send for your copy of this Guide

Day after day this Cleveland machine has been turning out an average of 450 pieces per hour! Two cradles operate on a 2 position, air-operated shuttle. Operator loads shell in open cradle and pushes palm start switch. At end of tap cycle in progress the new part is brought into tapping position and the tapped part brought out to one side for unloading.

Cleveland engineers have designed machines to meet the special requirements of scores of plants throughout the country. Because of their know-how—because of the precision tapping achieved at high speeds by Cleveland's famous lead screw feed and because several operations can be combined in one machine—you can be sure of getting more perfect pieces per hour with a Cleveland machine designed for *you*.

Write today for Catalog No. **TL-34**

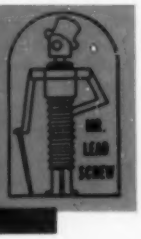
THE CLEVELAND TAPPING MACHINE CO.

A Subsidiary of AUTOMATIC STEEL PRODUCTS, INC.

CANTON 6, OHIO

For Better Tapping--Faster!

CLEVELAND lead tapping machines screw



FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-167

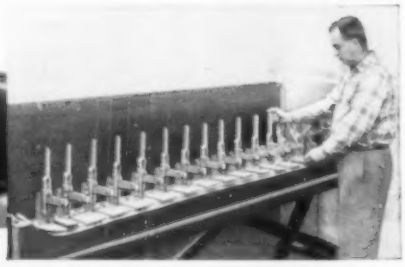
"Okey, we'll forget the raise, but the Heavy Blanking Department gets Columbia Atmodie and that's final!"

COLUMBIA TOOL STEEL COMPANY • CHICAGO HEIGHTS, ILL.

Producers of fine tool steels—High Speed Steels
Die Steels—Hot Work and Shock Resisting Steels
Carbon Tool Steels.

TOOL COLUMBIA STEELS

DESTACO HOLDS THE EDGE



Photos: Courtesy Holley Ski Co., Detroit, Michigan

Skiers know proper edging is most important for smooth slalom maneuvers. In production, precision tooling is necessary to obtain quality products. In the manufacturing of Plasti-Glass Skis the Holley Ski Company use De-Sta-Co's Model 620 Plunger Clamps to provide proper pressure during the slotting of the skis at a 22½ degree angle to allow for a patented moulded edge. Fifteen De-Sta-Co Model 110-C Toggle Clamps with Pressure-Matic adapters provide the necessary holding force to the welded angle plates which hold the ski in place during the cementing of the spring steel edges. Completely retractable the clamps allow easy insertion and removal of the skis from the drying fixture.

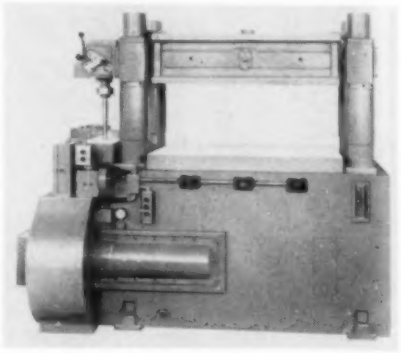
There's a De-Sta-Co Toggle Clamp engineered for your work-holding problems in assembly, welding, bonding, machining or inspection. Select from over 40 fixture and portable models. Positive holding pressures up to 4000 pounds. Write today for a copy of the De-Sta-Co catalog describing available stationary and portable toggle clamps.

DESTACO DETROIT STAMPING COMPANY
328 Midland Ave. • Detroit 3, Mich.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-168

Die Tryout Press

Alpha Tool Works, 9281 Freeland Ave., Detroit 28, announces a 100-ton die tryout press incorporating many features. The press occupies comparatively little floor space, 75 x 84 inches. Overall height is 82 inches. The head can be quickly released and rotated to any point up to 240 degrees. This permits the operator to barber, spot, shear, fit and finish both punch and die without removing the die from the press.



The four-post construction assures perfect alignment of both punch and die. The drive mechanism is housed in the base and pulls the head down. The air clutch is a combination flywheel type, air operated, with multiple disc brake. The electrical controls of the clutch permit inching, single stroke, continuous operation and forward or reverse operation. Two safety push-button controls and one emergency stop button are standard equipment. Capacity is figured at pin-point tonnage at any one point in the bed. The die tryout press has a 6-inch stroke and operates efficiently at 50 strokes a minute. Force feed lubrication is employed at all working parts. **T-3-1681**

Pressure Lubricant

Molylube Anti-Seize is a highly concentrated molybdenum disulfide compound which will not melt even at temperatures above 600 degrees F. It is suitable for extreme pressure applications such as are encountered in machine tools, automatic production machines and other operations.

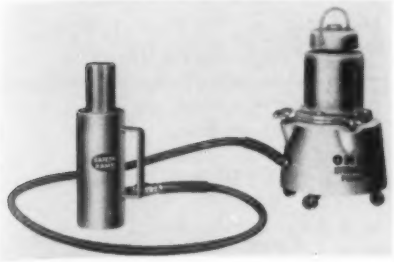
A homogenizing process and the use of special synthetic additives make it possible for Anti-Seize to remain in suspension longer than dry molybdenum disulfide when mixed in machine and cutting oils.

The compound protects against corrosion besides preventing seizing and galling at bearing pressures well over 10,000 psi. It is available in 3-oz single tubes in cartons of 6 or 12 and in 24 oz cans. Bel-Ray Co., Inc., Green Village Road, Madison, N. J.

T-3-1682

Hydraulic Pump

Air operated, requiring only a simple air-line connection, Ohio hydraulic pumps are designed for continuous service at maximum capacity without fear of overheating or overloading. Smooth hydraulic pressure is provided from 0 to 12,000 psi. The Ohio pump is universal and can be adapted to any



hydraulic installations and to manually operated arbor presses. Weighing only 35 lb, it may be carried, rolled on its four bearing casters or mounted for stationary use.

A companion product, the Ohio safety ram, is designed to provide complete safety for operator and equipment at all times, even when fully extended. The Ohio ram unloads itself automatically to prevent any possibility of plunger pop-out. It is available in 20, 35 and 70-ton capacities.

Both Ohio hydraulic pumps and safety rams are manufactured under exclusive license by Powermatic, Inc., 1944 East Market St., Akron 5, Ohio.

T-3-1691

High Density Metal

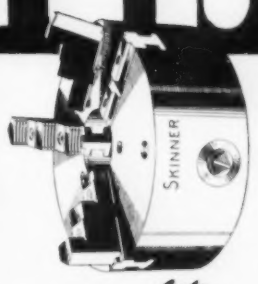
Comprised chiefly of tungsten, this noncutting metal of extremely high density has a specific gravity in excess of 17.5 GMS/CC which is about 50 percent greater than lead. This new metal is being used very successfully to resist the penetration of radioactive rays and its use for atomic radiation screening is increasing rapidly. It is readily machined with carbide-tipped tools. This material can be produced in sizes up to 25 inches OD by 40 inches long and in weights in excess of 1,000 lb.

In addition, the above tungsten alloy is finding wide application as a metal suitable for static and dynamic balancing, as well as other applications requiring maximum weight in minimum space. Among applications in active use today is the use of this metal for balance weights on crankshafts, gyroscopes, propellers and centrifugal clutches.

Further information can be obtained by writing Metal Carbides Corp., 107 E. Indianola Ave., Youngstown, Ohio.

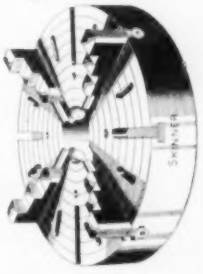
T-3-1692

SKINNER



quality

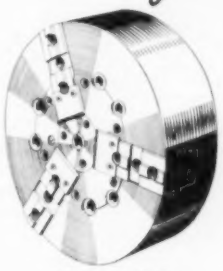
SCROLL CHUCKS Self-centering models for light, medium and heavy duty jobs in tool room or for production runs. Available in sizes from 3" to 18" with semi-steel or forged steel bodies, and heat-treated alloy steel for all other parts. Provided with two sets of solid jaws or two-piece jaws for holding internal or external work. Lands on the jaw, jaw steps and end bites are ground after the chuck is assembled.



INDEPENDENT CHUCKS Models for medium and heavy duty tool room and general machine shop work. Available in sizes from 4½" to 36" with semi-steel, steel, or forged steel bodies. All other parts are heat-treated alloy steel. Jaws are solid reversible or two-piece with reversible tops for either internal or external gripping. The body surrounds more than 60% of each operating screw for the full length of the screw to assure proper alignment at all times.

accuracy

AIR & POWER CHUCKS Self-centering models for heavy duty production work on engine and turret lathes and automatics. Sizes from 6" to 24" with forged steel bodies, and with either 2 or 3 jaws are available. The wedge angle is such that work is gripped positively regardless of jaw position. The chuck will not release the work, even if air line is broken, until operator actuates draw bar. Skinner also has a complete line of power chucking accessories.



MACHINE VISES Skinner vises are accurate, fast acting and positive gripping. Series DPV wrench-operated Vises have semi-steel body and hardened and ground work holding surfaces. They have all the universal features so necessary for drill press operations. Clamp the work for drilling in one plane — drill — turn the vise on edge for all right angle drilling operations.

Series FS Vises have swivel base for accurate indexing necessary in milling operations. Top of the movable jaw is ground parallel to the base for use as an indicating base for setting cutters, trueing work, etc.

long life

Details on the full line of products are included in Skinner General Catalog — write to the company or your nearest Skinner distributor for a free copy!

positive grip

THE SKINNER CHUCK COMPANY
212 Edgewood Ave., New Britain, Conn.

THE CREST OF QUALITY

SKINNER CHUCKS

Chucks - Vises

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-169

WHY is it 4-to-1* for IDEAL Live Centers?

*Named "Leading Brand" 4-to-1 over any other in a nation-wide survey of industrial distributors.

THE answer to this over-whelming preference lies in the way IDEAL Live Centers are built . . . in their micrometer accuracy and their bulldozer durability. Their unique construction makes them practically vibration-free and deflection-free. Short overhang and precision-type bearings insure the utmost rigidity in turning. All parts are hardened and precision ground. Special seals keep out chips, coolant and other foreign matter. It's this *built-in* performance that makes them a 4-to-1 favorite.

Multi-Duty Models with Male, Female or Pipe Points; Heavy-Duty Models, accurate to .0005" for jobs up to 18,000 lbs. *For any job, you can't buy better!*

Sold Through America's Leading Distributors

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Sycamore, Illinois

Please send me catalog data on IDEAL Live Centers and OTHER PRODUCTION SPEED-UPS AS INDICATED:

☐ Electric Etchers ☐ Tachometers
☐ Electric Markers ☐ Demagnetizers

Name_____
Company_____
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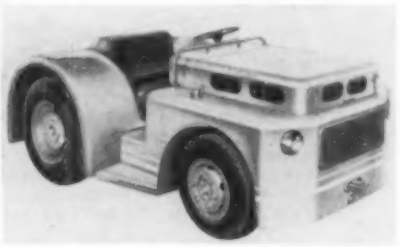
City_____ Zone____ State_____

INDICATE A-3-170

Towing Tractor

A towing tractor, the Clarktor-120, has been designed by the Clark Equipment Co. to meet the requirements of aircraft manufacturers, commercial airlines, and heavy industry. The Clarktor-120 has a drawbar full rating of 12,000 pounds and is powered by a 16A Chrysler engine. Fluid coupling, exclusive axle design and low silhouette are features of the new tractor.



The six-cylinder Chrysler gasoline engine develops 114 brake hp at 3200 rpm. Its displacement is 265 cubic inches, and it provides 215 foot pounds maximum torque. Together with fluid coupling, this engine provides greater horsepower at low engine speed, which means less wear and longer life for the power unit.

A fluid coupling combines smooth operation with full engine torque at low starting speeds. It serves to couple the engine's torque with the disengageable dry clutch plate, thus permitting the engine to deliver maximum torque in preparation for moving the load. In addition, the fluid coupling acts as a shear pin: it will slip within itself before it will slip the clutch or transmit shock stress to the gears. It safeguards objects which require a slow, steady initial pull. The fluid coupling is relatively simple to service, since it has few moving parts.

The tractor has four speeds forward, with a maximum of 16.3 mph, and one reverse 2.17 mph. The special heavy-duty four-speed transmission is of Clark's own manufacture. It incorporates rigid shafts and precision spline fits. Helical gears and mainshaft are made of carburized alloy steel, forged and heat treated to obtain maximum properties of the steel for clash, wear, distortion and strength. The shift lever is tower-mounted on the transmission.

The tractor steers and handles much like a conventional commercial truck, with operating controls placed for maximum comfort and efficiency. An adjustable cushion driver's seat is standard. The instrument panel, on which all instruments are mounted, is directly in front of the driver. A truck-type steering gear assures easy steering. Twin gas tanks, each with its own gage on the dashboard, have a total capacity of 25 gallons and enable the tractor to operate 8 to 10 hours without refueling. Truck-type hydraulic brakes, with 2[illegible] square inches braking area, are standard. An electric horn, headlights and tail lights, are standard equipment.

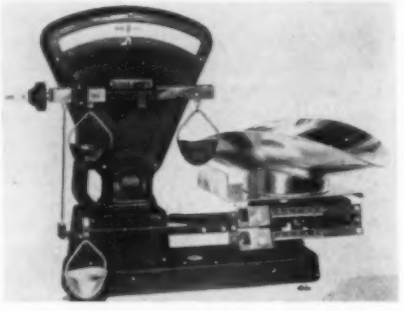
A Holland automatic coupler is standard equipment. The coupler mounting is drilled to locate the coupler at standard height, 18¼ inches from floor to eye center. Other mounting holes can be drilled and tapped for other heights, as desired.

For detailed literature, including performance curves of the Chrysler Model 16A engine, write to Clark Equipment Co., Industrial Truck Div., Battle Creek, Mich. **T-3-1701**

Counting Scale

No type of scale proves such a time-saver as the counting scale that enables counting operations to be speeded, and which minimizes possibility for error on the part of operators, even should they become inattentive or tired.

By employing differently colored ratio scoops, with matching brackets, it is virtually impossible to confuse counting pans. The result is that counting can be done more quickly and with standard accuracy.



The Detecto-Gram fan-type counting scales are available with double or triple fixed ratio counting attachment, a triple ratio scale having 1/100th-ounce sensitivity on the third pan.

These portable bench scales provide ideal instruments for counting small items and parts with speed and precision. Easily transferred from one location to another, they can be used wherever required to check piecework, issue parts from stock, count parts as received, count units for packaging, simplify accurate inventory.

Detecto fan counting scales handle loads up to 40 lb for counting purposes. They can be employed for weighing loads up to 20 lb when utilized for straight weighing operations. Standard equipment includes large commodity platter and large galvanized footed scoop. Beams, single or double, 10 lb each, are supplied on request. Made by Detecto Scales, Brooklyn, N. Y.

T-3-1702

Who's Meeting--and Where

Mar. 2-6. AMERICAN SOCIETY FOR TESTING MATERIALS. Spring meeting, Hotel Statler, Detroit. Contact society office, 1916 Race St., Philadelphia, for more information.

Mar. 8-11. AMERICAN INSTITUTE OF CHEMICAL ENGINEERS. Annual spring meeting, Hotel Buena Vista, Biloxi, Miss. Institute headquarters, 120 E. 41st St., New York 17, can supply details.

Mar. 9-11. MANUFACTURING STANDARDIZATION SOCIETY OF THE VALVE & FITTINGS INDUSTRY. Annual meeting, Commodore Hotel, New York. Society headquarters 420 Lexington Ave., New York, can provide further information.

Mar. 11-12. SOCIETY OF THE PLASTICS INDUSTRY, INC. Annual Canadian conference. General Brock Hotel, Niagara Falls, Canada. Complete information available from society's headquarters, 67 W. 44th St., New York 36.

Mar. 15-19. AMERICAN CHEMICAL SOCIETY. Spring meeting. Hotels Statler and Biltmore, Los Angeles. Society office, 1155 Sixteenth St., N. W., Washington 6, D. C., for more information.

Mar. 16-20. NATIONAL ASSOCIATION OF CORROSION ENGINEERS. Annual meeting, Sherman Hotel, Chicago. Get complete data from Association headquarters, 1061 M & M Bldg., Houston.

Mar. 17-20. AMERICAN SOCIETY OF TOOL ENGINEERS. Leadership Conference and annual meeting, Statler Hotel, and at Society Headquarters Bldg., 10700 Puritan Ave., Detroit 21.

Mar. 19-20. AMERICAN HOT DIP GALVANIZERS ASSOCIATION. Annual meeting, Netherlands Plaza Hotel, Cincinnati. More facts are available from association headquarters, 1506 First National Bank Bldg., Pittsburgh.

Mar. 23-27. AMERICAN SOCIETY FOR METALS. Sponsoring Western Metal Exposition, with 19 other national technical societies cooperating. Pan-Pacific Auditorium and Hotel Statler, Los Angeles. For details, contact ASM headquarters, 7301 Euclid Ave., Cleveland.

Mar. 25-27. SOCIETY OF AUTOMOTIVE ENGINEERS. National production meeting, Statler Hotel, Cleveland. Society headquarters, 29 W. 39th St., New York, can provide details.

Mar. 25-27. PRESSED METAL INSTITUTE. Annual spring technical meeting, Carter Hotel, Cleveland. Get full information from institute office, 2860 E. 130th St., Cleveland.

Mar. 31-Apr. 2. MAGNESIUM ASSOCIATION. International Magnesium Exposition, National Guard Armory, Washington, D.C. Further details may be had from Calvin H. Corey, general chairman, 261 Constitution Ave., Washington 1.

Apr. 11-21. SWISS INDUSTRIES FAIR. 37th Annual Industrial Exhibition, Basel, Switzerland. Mr. O. Goetz, Commercial Counselor, Consulate of Switzerland, 75 E. Wacker Dr., Chicago 1, can supply all particulars.

Apr. 27-May 8. BRITISH INDUSTRIES FAIR. Exhibition of consumer goods at Olympia and Earls Court in London and of heavy industrial goods at Castle Bromwich, Birmingham, England. Write British Information Services, 30 Rockefeller Plaza, New York 20, for more data.

Mar. 11. FOUNDRY EDUCATION FOUNDATION. Annual meeting and technical, university and industry advisory committee conference. Hotel Cleveland, Cleveland. More details may be had by addressing Terminal Tower, Cleveland 13.

Mar. 17-18. STEEL FOUNDERS' SOCIETY OF AMERICA. Annual meeting, Edgewater Beach Hotel, Chicago. For particulars, write to 920 Midland Bldg., Chicago.

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COSTS LESS with a Fray
No. 10-R UNIVERSAL RAM • TURRET TYPE • VERTICAL
MILLING MACHINE
You get a wider work range than with any other machine this size. You can machine at any angle—vertical, horizontal or both. You can mill, drill or bore at any angle. Hence resetting isn't necessary. Just change the machine—changing is quick. (For vertical and regular horizontal milling, use the 10-RH.) Jobs are done faster and better . . . at less cost. • It's Universal • Rugged • Easy to Operate.
A high precision tool.
Write for details and specifications.
Bulletin 10.
FRAY "ALL-ANGLE" HEAD TYPE 4
For deep, heavy cuts. Permits working to extra close limits. Any angle up to compound 2-way. Request Bulletin 4.
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All-Angle
FRAY MACHINE TOOL CO.
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FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-171

Technical Shorts . .

How PRECISION investment Microcast parts are mass produced for industry is explained in a recently released color movie which shows the process step by step. The 22-minute, 16-mm film, "Microcast — A Story of Industrial Progress," offers a thorough discussion of the operation, stressing its resulting economical production of high temperature alloys including some considered practically non-machinable.

Originated and developed by Austenal Laboratories in 1929, the process first was used in production of dental and surgical appliances. Later, however, it was adapted to production of power blades and buckets for large bomber aircraft turbo-superchargers. Following the war, Austenal cast power blades for new jet engines then being produced. Since that time, much of the power blading for centrifugal and axial flow type jet engines has been produced by the Microcast method. In addition the method has attracted many peace-time industrial users.

The movie gives the complete production story as well as presenting the potential available to design engineers for working with high melting point alloys. Information on the picture, which is available without charge, may be obtained from Microcast Dept., Austenal Laboratories, Inc., 244 E. 39th St., New York 16.

* * *

Five THOUSAND YEARS of progress in forging metal have been studied, edited and assembled into a 20-minute sound film now in production for Utica Drop Forge & Tool Corp.

Months of research have gone into the project to obtain and verify data which traces the use of pliers and wrenches through the centuries. It will include ancient methods of smelting and forging. Authentic medieval tools have been reproduced by the craft shops of Kenneth Lynch & Sons, who make armor for collectors and museums in order to present particular periods realistically. The film then will follow on through industrial history and finally to the most modern methods for turning out forged parts to extremely close tolerances.

* * *

A QUARTERLY publication *The Volkert View* has recently made its appearance on the industrial scene. Highly illustrated, the publication features precision metal stamping case histories. For example, the first issue has dealt with a story on how precision stampings "shoot" the picture onto the television screen.

Names of anyone interested may be added to the mailing list now being compiled by writing to the company publishing the piece, John Volkert Metal Stampings, Inc., 222-34 96th Ave., Queens Village 8, L.I., N.Y.

* * *

An UNUSUAL lubricant has been placed on the market after three years of rigid testing and application under industrial and automotive conditions. The material, known as "Plastilube," was developed by engineers of the Warren Refining and Chemical Co. who were searching for a solution to the problems of grease breakdown under extreme conditions. They have called it "successor to grease" and claim it as the greatest advance in multipurpose lubrication in the past two decades.

Fundamentally, it is a stable chemical compound without a soap base. This results in its adaptability under almost any stress or temperature, which is its main virture. As compared to this adaptability, soap base grease lubricants are inclined to separate especially under high pressures and clog parts. Plastilube, it is said, will not break down, and at the same time will not

. . . the answer to ALL your centering problems

INTOCO centers are of two-piece design, consisting of a shank and replaceable tip. Just 5 different sizes of tips when used with the proper size INTOCO shanks fit all sizes of Morse, Brown & Sharpe, and Jarno tapers.

Interchangeability of tips is an outstanding feature of the INTOCO line of 2 piece centers. These 5 tips are available in four different alloys to fit the many different applications . . . Cobalt Base Alloy, Nickel Base Alloy, High Speed Steel Alloy, Carbide.

INTOCO Tips are ground all over to give perfect concentricity and seating. To replace, you need only knock out the old and install the new. No special tools required. Write today for free 8 page catalog which gives complete specifications on this line of 2 piece centers.

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lt nor freeze. It remains adhesive boiling water, yet retains its pumpability at low temperatures. Consequently its main use, at least at present, is for lubrication of bearings where temperatures vary from below freezing to more than 500 degrees F.

* * *

A SOMEWHAT remarkable material now being used increasingly in the textile industry may well find a broad reception by the industrial manufacturing people. Known as "Teflon" polytetrafluorethylene finish, its chief advantage appears to be as a coating on machinery parts because practically nothing will stick to it. To date, most extensive application is on slasher cylinders where it greatly prolongs the period between clean-ups.

Teflon is a DuPont-developed plastic. A specially compounded aqueous dispersion is sprayed by conventional methods and fused at around 700 deg F. Present records show about 15 custom applicators of the material nationally, while a number of firms are doing their own coating.

Added to its anti-sticking property, Teflon indicates several other qualities. There is no known solvent for the material, thus it is unaffected by any of the chemicals normally used in the textile industry where it is presently concerned. Its low coefficient of friction makes it slippery or waxy to the touch, and it remains solid up to 620 deg F. though its maximum recommended operating temperature is 480 deg.

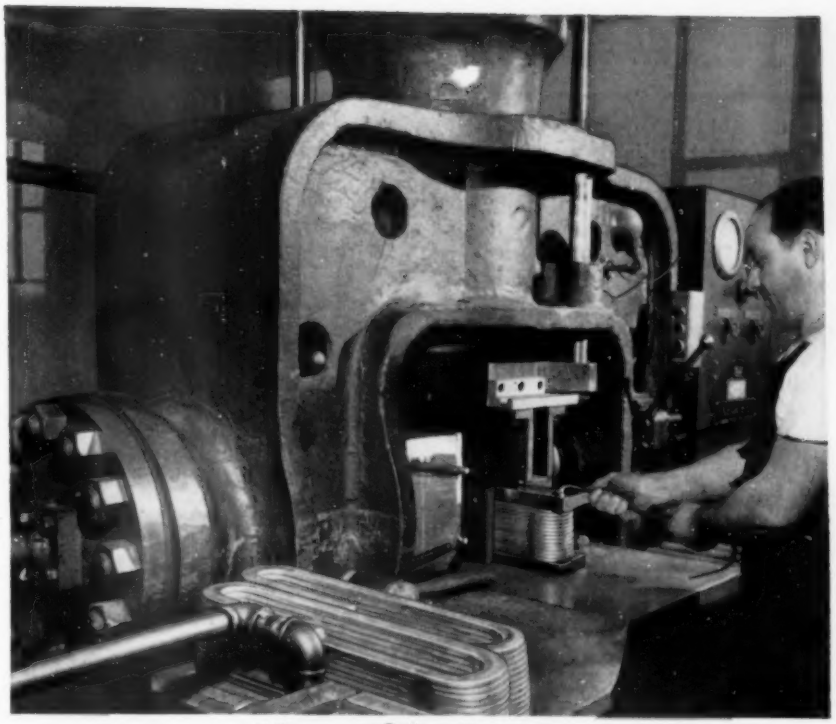
* * *

AMONG PATENTS recently released for public use by the United States Atomic Energy Commission is No. 2,613,305 for an unusual welding device. This patent describes an improved welding device for welding in an evacuated space by electron discharge between the parts to be welded and preferably multiplying the number of electrons by a resonant interchange of energy between the adjacent surfaces to be joined.

In releasing them, the commission made it known it will grant non-exclusive, royalty-free licenses for the patents in accordance with its program to make non-secret technological information available for use by industry.

* * *

PLANS have been approved by Pivot Punch and Die Corp. for a large addition to its second plant which was completed only six months ago. At the same time the company announced that its president and vice-president, Robert H. King and John F. Kopczynski have made a tour of South America to complete plans for distribution of their products on that continent.



How this 2-way

FARQUHAR Hydraulic Press

forms motor and generator coils

In producing motor and generator coils from ¼ x 1-in. copper stock, the stock is first bent and the ends laminated, and then pressed to restore them to their original thickness. Then, the coil is put in this Farquhar 2-way Hydraulic Press for "pressing" the form.

The coil is laid on a steel block, a three-part filler mandrel inserted, and a top block applied. The press "snugs" the coil sides at low pressure (40 tons); then the vertical ram snugs the top. The operator kicks the pressure-shift pedal, to double vertical-ram pressure for forming.

Capacities of rams are 100 tons horizontally and 200 tons vertically. Illustration above shows operator withdrawing the coil after forming has been completed.

Farquhar Presses Cut Your Costs

The above installation is just one more example of Farquhar performance in heavy production! Farquhar Presses are built-for-the-job . . . assure faster production due to rapid advance and return of the ram . . . greater accuracy because of the extra guides on the moving platen . . . easy, smooth operation with finger-tip controls . . . longer life due to positive control of speed and pressure on the die . . . long, dependable service with minimum maintenance cost!

Farquhar engineers are ready to help solve whatever production problem you may have. Their expert assistance is yours for the asking. Give them a call . . . at no obligation, of course!

Or, send for our free catalog showing Farquhar Hydraulic Presses in all sizes and capacities for all types of industry. Write to: THE OLIVER CORPORATION, A. B. Farquhar Division, *Hydraulic Press Dept.*, 1519 Duke St., York, Pa.

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HYDRAULIC PRESSES
for Bending • Forming • Forcing • Straightening • Assembling • Drawing
Extruding • Jogging • Forging • and other Metalworking Operations
THE OLIVER CORPORATION • A. B. FARQUHAR DIVISION

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-173

TRADE LITERATURE

Free Booklets and Catalogs Currently Offered By Manufacturers

Plastic Mold

Four-page bulletin 63, "Finish Plastic Molds in Minutes," shows how wet blasting is used in both original manufacture and in reconditioning maintenance of molds to effect savings in time, labor and reduce manual polishing requirements. **American Wheelabrator & Equipment Corp.**, 1182 S. Byrkit St., Mishawaka, Ind. **L-3-1**

Sheet Metal

Illustrated brochure gives comprehensive view of company's fabricating plant and facilities as well as offering the reader a full view of the typical parts and products manufactured there from galvanized and black sheet steel, aluminum and stainless alloys and plate. **The Kirk & Blum Mfg. Co.**, 3189 Forrer St., Cincinnati 9. **L-3-2**

Press Brake

Illustrated brochure P-752 deals with press brake which meets requirements for forming and stamping sheet metal; emphasizes design and manufacturing standards, convenience in use and precision performance. **Struthers Wells Corp.**, Titusville Div., Titusville, Pa. **L-3-3**

"MARVEL" HAS always had the edge

MARVEL High-Speed-Edge Blades assure Faster, more Accurate cutting with proven Economy and complete Safety. Only the MARVEL is a composite blade with a high speed steel cutting edge electrically welded to an exceptionally tough, strong alloy steel body.

The High-Speed-Edge does the cutting while the alloy back with hardened eyes, carries the load. Blade tensions up to 300% higher than those possible with ordinary blades are recommended. This greater tension is confined to the cutting or leading edge by the location of pin holes (exclusive MARVEL design feature) and cannot be overcome by work resistance. Heavier feeds and greater speeds are practical without "run out."

With greater accuracy, higher production and lower cost per cut, come the extra dividend of Safety, for MARVEL High-Speed-Edge Hack Saw Blades are Positively Unbreakable—*they will not shatter.*

Ask your local MARVEL distributor (see classified phone book) to help you modernize your metal sawing with MARVEL High-Speed-Edge Blades. They cost no more than ordinary blades.

1. High-speed-steel cutting edge.

2. Tough unbreakable alloy steel body with hardened eyes.

1. & 2. Integrally welded to make a fast-cutting, long lasting composite blade that is *positively unbreakable.*

Metal Cutting MARVEL SAWS
Better Machines—Better Blades

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Ave. Chicago 39, U.S.A.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-174

Gaging

"Continuous Gages and Controls" discusses equipment for constant, precision control in high speed production of such materials as metal, wire, foil, plastic, linoleum, paper, paperboard and rubber. Widely illustrated, shows both close-ups of gages and also applications pictures of the gages at work. **Pratt & Whitney**, Div. Niles-Bement-Pond, West Hartford 1, Conn. **L-3-4**

Control

Illustrated 28-page brochure features multi-unit control centers; complete explanation from purpose to the final construction included as well as lists of unit dimensions and ratings and typical applications. Layout charts and floor arrangements simplify planning. **Allen-Bradley Co.**, Milwaukee, Wis. **L-3-5**

Cleaner

Leaflet completely describes cold cleaners for removing soil, oils, drawing compounds, etc., in industrial metal cleaning; outlines particular advantages proved through use and economy. **E. F. Houghton & Co.**, 303 W. Lehigh Ave., Philadelphia 33. **L-3-6**

Gear Finishing

Four-page illustrated bulletin 870-C-52 describes internal gear finisher for spur and helical gears to 12 in. OD; points out special design features and includes complete specifications. **Michigan Tool Co.**, 7171 E. McNichols Rd., Detroit 12. **L-3-7**

Motors

Pocket-size slide rule enables user to select at a glance the motor best suited to particular job; provides detailed information on 35 fractional hp motors. Howard Motor Selector gives full load rpm, full load continuous and intermittent amps, continuous and intermittent efficiency, ventilation, core size, winding type and voltage. **Howard Industries, Inc.**, Racine, Wis. **L-3-8**

Alloy Metals

Pamphlet explains service whereby precision casting foundries may quickly obtain stainless, "super" stainless and alloyed tool steels specifically developed for remelting purposes; shows new plant and its facilities including laboratories, melting equipment, etc. **Cannon-Muskegon Corp.**, P. O. Box 506, 2875 Lincoln St., Muskegon, Mich. **L-3-9**

iesel Engines
Sectional drawings, installation view d diagrams included in TS Diesel gine bulletin 10027; includes speciations, weights, performance curves, d dimensions and tables. **Ingersoll-nd Co.,** 11 Broadway, New York 4. **L-3-10**

-Belts
"Texrope" grommet v-belts, which promise 20 to 50 percent longer life, re described in illustrated folder 20B-197A picturing reasons for higher gripping pressure, strength and other advantages. **Allis-Chalmers Manufacturing Co.,** 1004 S. 70th St., Milwaukee, Wis. **L-3-11**

Fastening
Brochure on "The Milford Method" presents company's facilities for helping solve industry's fastening problems, including research, engineering and production levels. Widely illustrated. **The Milford Rivet & Machine Co.,** Milford, Conn. **L-3-12**

Press
Folder introduces German-built Alfing heavy duty upright drill press specifically designed to meet operating requirements of mass-production methods; points out particular advantages and features, and includes specifications. Illustrated. **Kurt Orban Co., Inc.,** 205 E. 42nd St., New York 17. **L-3-13**

Twist Drills
Sixteen-page catalog 51-816 covers broad variety of twist drills for general and special uses, in fractional, letter and wire sizes; also lists drill sets, drill and reamer blanks, countersinks, Morse taper extension sockets, etc. Also offers useful information on drill pointing, web thinning, and a table giving decimal equivalents of drill sizes. **DoAll Co.,** Des Plaines, Ill. **L-3-14**

Tool Bits
Catalog lists and illustrates complete line of carbide tipped and high-speed tool bits. Carbide line includes turning tools, offset side and end cutting, pointed and square nose, and 600 angle threading tools. High-speed line covers square, rectangular and standard cut-off types. **Whitman & Barnes,** Plymouth, Mich. **L-3-15**

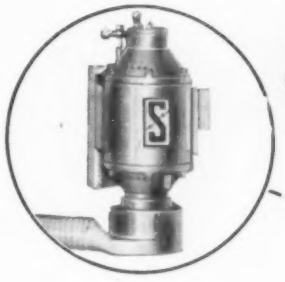
Washers
Booklet gives details about line of industrial washers. Profusely illustrated with photos of broad range of equipment. Also includes general washer operating hints of particular interest to plants using alkali or emulsion washers in production cleaning line. **Detrex** Corp., Box 501, Detroit 32. **L-3-16**

Presses
Line of recently introduced gap frame double crank presses are pictured and described in bulletin 65-B which presents detailed discussion of advantages and special features; close-up photos and drawings bring out points carefully; includes extensive specification list for each model. In addition, there is a complete discussion and illustrated demonstration of the air actuated, electrically controlled sleeve clutch. **Niagara Machine & Tool Works,** 637-697 Northland Ave., Buffalo, N.Y. **L-3-17**

Coolant, Filtering
Informative bulletin describes line of filtering systems for coolants and cutting oils. Well illustrated with drawings and diagrams. **Wm. W. Nugent & Co., Inc.,** 410 N. Hermitage Ave., Chicago 22. **L-3-18**

Carbide Tools
Comprehensive 48-page illustrated catalog describes line of nearly 800 carbide tools; includes specification lists and drawings; designed as reference piece for designers, engineers and production supervisors. **The Nelco Tool Co.,** Manchester, Conn. **L-3-19**

NOW... you can make your machines
double purpose machines with
STANDARD'S
PRECISION GRINDING ATTACHMENT



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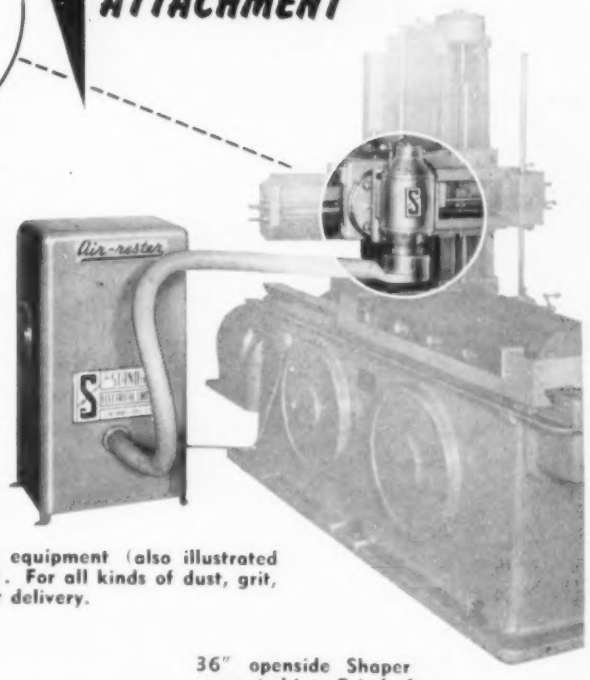
Type PAV from ½ H.P. to 25 H.P. Speeds from 3600 to 1200 R.P.M. Equipped with vertical or horizontal feed, or both. Micrometer feeds. Hollow spindle for wet grinding. For cup wheel, plate mounted cylindrical wheels, or straight grinding wheel. "AIR-RESTER" dust collecting equipment (also illustrated and available separately). For all kinds of dust, grit, etc. Three Sizes. Prompt delivery.



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the **STANDARD** electrical tool co.
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See us at booth 660, Western Metal Congress, March 23-27, Los Angeles

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-175

Production News

ABOUT *Lusol*—THE ALL-CHEMICAL METAL-WORKING SOLUTION

FROM F. E. ANDERSON OIL COMPANY, INC. • PORTLAND, CONNECTICUT

Lusol IS MORE THAN A COOLANT

...it's a Service

M. S. Phoenix, Chief Engineer of Lusol's tool engineering staff, advises on a difficult grinding job.

Sometimes a smart coolant salesman can make minor adjustments on a machine tool, which enable him to speed up its operations. Then he says, "Look what *our* coolant has done for you! Use it on all your machines."

Lusol service engineers don't depend on such sketchy performance to prove-in their product. They clean out the machine you have assigned for the initial test, then install Lusol in proportions that are proper for the task involved. They draw on their extensive tooling experience to help you get the most out of that machine.

Foremen and operators see what Lusol is accomplishing there—faster speeds and feeds, finer finishes, longer tool life, smoke-free atmosphere, freedom from skin irritation. They say, "Let's try Lusol on that job, too. It's a tough one." And so the use of Lusol spreads, not through sales pressure, but from within each user's organization.

"Will Lusol work in my plant?" The fact that Lusol *works* on turning, milling, grinding, drilling, roll-forming and so on has been demonstrated time after time. We can cite hundreds of case histories testifying to that. Now the question is, "Can your machines take full advantage of what Lusol has to offer?"

Write for the booklet, "Lusol Gets to the Point," for evidence of its time- and money-saving ability. Then ask to have our representative call; he will make the necessary arrangements to prove-in Lusol at your plant.

Send for a free copy of the booklet "Lusol Gets to the Point"

F. E. ANDERSON OIL COMPANY, INC.

Box 213-J, Portland, Connecticut

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-176

Metal

"Proof that Meehanite Bridges the Gap Between Cast Iron and Steel" presents series of case histories showing use of Meehanite castings to solve problems resulting from critical material shortages. Alphabetical tabulations show specific replacements of alloyed irons and steels, brass, bronze, forgings, etc., and the type of Meehanite metal used for such applications. **Meehanite Metal Corp.**, New Rochelle, N. Y. **L-3-20**

Presses, Hydraulic

Illustrated brochure deals with company's hydraulic presses, directing particular attention to details of construction features and explaining operations, advantages and other pertinent facts. **Clearing Machine Corp.**, 6499 W. 65th St., Chicago, 38. **L-3-21**

Lubricant, Dry

Pamphlet deals with advantages and time and money economies of recently introduced Powder'd Oils for grinding, cutting, broaching, tapping, threading and reaming. **Henry E. Sanson and Sons, Inc.**, 145 Quaker Ridge Rd., Manhasset, L.I., N.Y. **L-3-22**

Rust Prevention

Illustrated brochures discuss rust inhibiting paint S.R.P. (Sure Rust Prevention) for metal protection, explaining use and pointing out special features and advantages proven through numerous tests. Dept. P-5, **L. Sonneborn Sons, Inc.**, 80 8th Ave., New York 11. **L-3-23**

Industrial Freezers

Folder offers information on industrial freezers covering performance characteristics, sizes, temperature range and applications. Twelve models are illustrated with complete information regarding 36 standard models. **The Industrial Div., Webber Appliance Co., Inc.**, 2740 Madison Ave., Indianapolis 3. **L-3-24**

Spinning

Booklet on "Metal Spinning Tools and Their Use" covers the title subject emphasizing low tooling costs and conservation of metals; tells what to use and how to use it. Available to school instructors and department heads. **Boice-Crane Co.**, 834 Central Ave., Toledo 6, Ohio. **L-3-25**

Stamping Presses

Sixteen-page catalog describes entire line of stamping presses; gives condensed specifications for standard mechanical and hydraulic presses and press brakes plus data on special machines. **Verson Allsteel Press Co.**, 9336 S. Kenwood Ave., Chicago 19. **L-3-26**

Air or hydraulic

Good Reading

A GUIDE TO SIGNIFICANT BOOKS AND PAMPHLETS OF INTEREST TO TOOL ENGINEERS

PRACTICAL CALCULUS, *by Claude I. Palmer and Claude E. Stout. Second Edition. Published by McGraw-Hill Book Co., 330 W. 42nd St., New York 36.*

This book explains what calculus is, and shows how and when it can be used to get quicker, easier solutions to many mathematical problems encountered in industrial and shop work. It concentrates on giving the man with little mathematical training a thorough understanding of how calculus can be applied to practical problems. Avoiding involved mathematical terminology and phraseology throughout, it provides explanations that are as nontechnical as possible without loss of accuracy.

The previous edition's presentation of differentiation and integration is preserved. The book's emphasis on application, its integrated treatment, its presentation of methods and meanings, and the illustrations and examples make it easy to use.

New material has been added to this edition on Newton's method of approximating the solution of a numerical equation; approximate integration; differential equations; cylindrical and spherical space coordinates; and equations and graphs of the more common surfaces in rectangular coordinates.

TECHNOLOGY OF COATED AND PROCESSED PAPERS, *edited by Robert H. Mosher, Published by Remsen Press Division, Chemical Publishing Co., Inc., 212 Fifth Ave., New York.*

This is a companion volume to Specialty Papers and covers the more technical aspects of the subject for the benefit of technical workers, chemists, and engineers. It is the only book in English language that presents a detailed picture of the modern raw materials, manufacturing processes and equipment, and formulations used in the various branches of the specialty paper business, discussing also the finished products and their evaluation.

Complied by a staff of specialists under the editorship of Robert H. Mosher, the book emphasizes the contributions of cellulose lacquers, synthetic rubbers, and new adhesives and pigments to the production of decorative and functional effects of paper.

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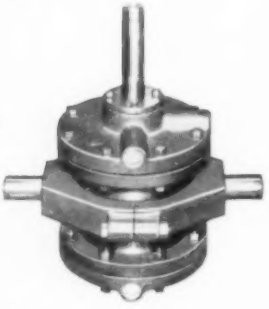

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CRERAR METAL ABSTRACTS, *Published by The John Crerar Library, 86 East Randolph Street, Chicago 1. Price, $50 per twelve issues.*

Started last August, Crerar Metal Abstracts includes abstracts from all current publications dealing with a selected list of metals which presently includes titanium, zirconium, hafnium, molybdenum and the rare earths. Added coverage is contemplated to include articles concerned with research aspects of the ferrous alloys. Additions will be made to the list as warranted by the interests of the subscribers and suggestions are welcomed by the staff.

The primary objective of this publication is to enable the research worker and engineer to keep abreast of the ever-increasing volume of technical literature in this particular field. Although the main concern of the subscriber probably lies in the purely metallurgical aspects of the metals, other topics, including geological considerations, industrial statistics, and both metallurgical and non-metallurgical applications, are also covered.

The source material used in compiling these abstracts includes all books, periodicals, separates and miscellaneous publications received by the Crerar Library during a monthly period beginning with the 15th of the month; the library is currently receiving more than 7,500 periodicals, English and foreign.

The type of abstract offered is mainly informative; an attempt is made to include enough material in the abstract to require reading of the original articles unnecessary. Such is the case for all highly pertinent research articles and critical reviews in the field. The abstracts covering ordinary reviews, articles of a more elementary or general nature, or news items are of a less informative nature. Photoduplication of all articles abstracted is an additional service available.

HANDY TOLERANCE TABLES, *by Alexander Michael, Sr. Published by Handy Length Book Co., 3507 Seventeenth St., Canton, Ohio. 144 pp; price, $2.00.*

The booklet is designed to minimize the figuring which consumes time. The format is designed for fast easy reading. The localizer chart included with the book eliminates the possibility of errors in reading by blocking out all but the pertinent figures.

The first section of the book is made up of 14 tables devoted to standard industrial fractions and decimal equivalents to three places with tolerances for ± 0.001 to ± 0.25. Part two contains 14 tables of machining tolerances to two decimal places and nearest fraction with the difference to three places.

North East West South IN INDUSTRY

The board of directors of **Raybestos-Manhattan, Inc.** have made a number of appointments. **W. Ward Kievit** was made treasurer, succeeding George R. Weber, recently deceased. Mr. Kievit also is comptroller and a director of the corporation. **William S. Simpson,** secretary and a director of Raybestos, became general manager of the division at Stratford, Conn. **Osborn H. Cilley,** who also is a vice-president and a director of Raybestos-Manhattan, became general manager of U. S. Asbestos-Grey-Rock Div. at Manheim, Pa. **S. R. Zimmerman, Jr.** was named assistant general manager of the Manheim division. He has been assistant sales manager and manager of automotive and industrial equipment sales, and director of friction material research and development.

Samuel Sloan Auchincloss has been elected president of **DeWalt Inc.,** subsidiary of **American Machine & Foundry Co.** Mr. Auchincloss, who has been executive vice-president of DeWalt since last August, succeeds Paul Gardner who has resigned. He has been with AMF since 1946 when he became a divisional vice-president of the company's Pinspotters Div. He also is a director of operations of AMF's Colorado Springs plant.

S. S. Auchincloss

J. H. Fassett

At a recent meeting of the board of directors of the **Hilliard Corp., John H. Fassett,** was elected a vice-president. Mr. Fassett, who has been with the organization since 1939, will also continue as manager of the Clutch Div., in charge of sales, engineering and service.

C. Brenton Cook, one of the pioneers of the industrial truck industry, has announced his retirement from **The Elwell-Parker Electric Co.** where he had been associated since 1914. He became vice-president and a director of the firm in 1942. In addition, he has been president of The Electric Industrial Truck Assn. and a director of the National Industrial Advertising Assn.

The board of directors of **Emhart Mfg. Co.** have elected **Warren E. Hill** vice-president in charge of operations, a new post. Mr. Hill, who until recently was executive vice-president of Flexible Packaging Div. of Shellmar Products Corp., will be concerned with all Emhart operating units which include Henry & Wright, Hartford-Empire and V & O Press Co. divisions.

Two new vice-presidents have been named at **Aeroquip Corp. Matthew J. Betley** who was a manufacturing executive in Sheboygan, Wis., prior to joining Aeroquip in 1952, is works manager. **George Fischer,** former sales and merchandising executive with B. F. Goodrich Co. until coming to Aeroquip the same time as Mr. Betley, is general sales manager.

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did this job *in 1/6th the Time*

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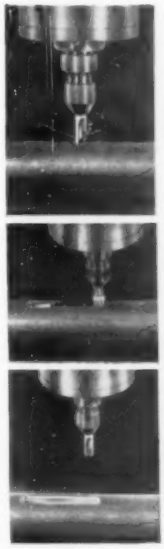

- Plunges into solid metal and mills. Will bore hole and mill in one operation.
- Eliminates Chatter—providing smoother cutting—a better job in astonishingly reduced time.
- Mills so smoothly that a finished cut is either not required at all, or to a much lesser degree.
- Stays sharp much longer—doesn't require resharpening as often.
- Provides Cooler and Freer Milling—More CHIP room decreases the chance of work overheating and twisting.

This tool is manufactured for use on all types of alloy steel, cast iron, brass and bronze. Sizes ranging from ¼" to 2" diameter.

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One of the objective tests used by Nelco Engineers was the cutting of a "keyway." (Results illustrated below) End Mills compared were high-speed steel and Nelco's new carbide tipped 3 FLUTE. Material was S.A.E. 1095 steel shafting. End Mills were 1.2" in diameter; a 3 H.P. milling machine was used in both cases; 2400 R.P.M. and 14" per minute feed was used for the carbide; 609 R.P.M. and 3" per minute feed for the high-speed steel.

OPERATIONAL RESULTS:

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At the election held during the annual meeting of The Aluminum Association recently the following officers were named for the ensuing year: **D. A. Rhoades**, of Kaiser Aluminum & Chemical Corp., is president; **A. V. Davis**, of Aluminum Co. of America, re-elected chairman of the board; and **Donald M. White** was re-appointed secretary and treasurer. Three vice-presidents elected included: **S. D. Den Cyl** of Bohn Aluminum & Brass Corp., **Raymond Deutsch** of Monarch Aluminum Mfg. Co. and **R. P. Stranahan** of Stranahan Foil Co., Inc.

Robert L. Fitzsimons has been appointed metallurgical engineer for **Jessop Steel Co.** Mr. Fitzsimons formerly was chief metallurgist of E. C. Atkins Co. where he had been associated for 30 years. With Jessop, he will fill a new post in saw and cutting steels created as a result of the company's current expansion in those lines.

Recent appointment has made **O. M. Marquardt** general manager of the **Tocco Div.** of the **Ohio Crankshaft Co.** Mr. Marquardt came to Tocco in 1948 from The Budd Co.

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Appointment of **Gilbert C. Strege** a president of **The Baker-Lull Cor** has been announced by the board o directors. Mr. Strege recently resigne as manager of the McBee Co.'s Techn cal Div. In confirming the appointmen the board of directors also approve the change in company name from th Lull Mfg. Co. Baker-Lull is a recentl acquired subsidiary of **The Baker-Raulang Co.**

According to recent announcement, **Harry M. Wallace** has been elected president of **Wheel Trueing Tool Co. of Canada, Ltd.**, Canadian subsidiary of Wheel Trueing Tool Co. He formerly was vice-president and general manager of the Canadian plant and vice-president in charge of the Diamond Drilling Div. of American and Canadian plants.

H. M. Wallace

C. E. Schmitz

Carl E. Schmitz has been named vice-president in charge of sales for **Crane Packing Co.** according to recent announcement. He formerly held the position of vice-president and director of engineering. Mr. Schmitz is a member of Chicago chapter of ASTE, and a former president of the American Society of Lubricating Engineers.

Four promotions recently were announced at **Norton Co. John Jeppson**, formerly assistant secretary and works manager, became vice-president. He remains as works manager of the Abrasive Div. **A. Donald Kelso**, president of Norton Behr-Manning Overseas, Inc., was appointed a Norton Co. vice-president in charge of foreign operations and was also made a director. At the same time, he retains his former post. **Howard J. Daly**, manager of bauxite and crude abrasive plants was elected to the board of directors. **Richard Prouty**, formerly assistant to the treasurer, was appointed assistant secretary of the company.

Promotions recently announced at **Temco Aircraft Corp.** made **W. N. Hall** superintendent, with his responsibilities covering 15 production departments. **Herman Muller**, formerly assistant superintendent, was named superintendent over all night operations at Temco.

Arnold I. Thorsen, works manager of **Allis-Chalmers Mfg. Co.'s** Norwood Works, has been appointed to fill the recently created position of assistant director of manufacturing of the company's general machinery division. In his new capacity, Mr. Thorsen will assist J. D. Greensward, vice-president and director of manufacturing of the division, in directing and coordinating manufacturing operations in the firm's general machinery plants.

Two manufacturing aides at **Bausch & Lomb Optical Co.** have been promoted according to recent announcement. **John D. Harby** has been made superintendent of Instrument Engineering, and **J. Donald Dutcher** was named superintendent of Instrument Manufacturing. Mr. Harby who has been in charge of instrument engineering and inspection, will now supervise all instrument engineering functions. Mr. Dutcher, who in 1946 was one of three Bausch & Lomb men awarded a Certificate of Exceptional Service by the Bureau of Navy Ordnance for producing a pressure-proof submarine binocular, will supervise manufacturing operations in the firm's precision optics, instrument parts, assembly, special order, foundry and optical machinery divisions.

George A. Gade has been made vice-president in charge of sales for **Standard Pressed Steel Co.** Mr. Gade, who formerly was manager of outside sales, succeeds to a post left vacant by the election almost a year ago of J. Whiting Friel as vice-president of the company.

OBITUARIES

Thomas S. Green, former director of **Norton Co.** died recently in Albany, N. Y. Mr. Green, who was 66 years old, had been connected with Norton for 35 years before his retirement in 1950.

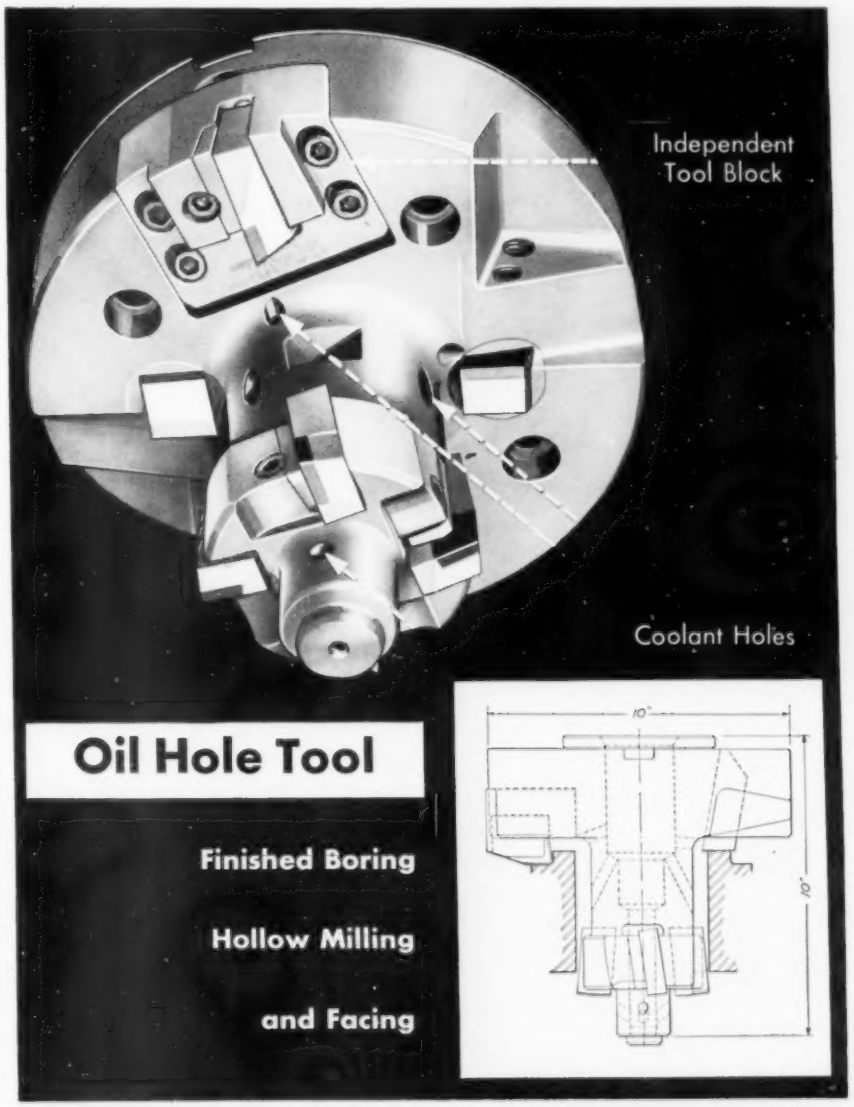
Frank M. Mason, vice-president of **U. S. Electrical Motors, Inc.,** died recently of a heart attack. He was 42. Mr. Mason was general manager of the company's Atlantic plant. Prior to that he was assistant chief engineer of the U. S. Motors Pacific plant in Los Angeles.

George R. Weber, vice-president, treasurer and a director of **Raybestos-Manhattan, Inc.** and general manager of its U. S. Asbestos Div. plant, died recently at his home in Lancaster, Pa. Mr. Weber became affiliated with U. S. Asbestos plant in 1921 and took an important part in creating the Raybestos-Manhattan merger in 1929.

Don F. Shook has been named the new president of the reorganized **Buckeye Brass and Mfg. Co.** He succeeds **Otto G. Gundel. Alan S. Dale,** formerly vice-president and director of Randall Graphite Bearings Co. has been appointed vice-president and general sales manager. **Leon Disinger,** who has been with Buckeye for 25 years, will continue as vice-president and general plant manager. The company plans a number of improvements calculated to broaden its activities and diversify its range of production.

Hans K. Reitz has been named factory manager of **Colonial Broach Co.** Mr. Reitz who has been associated with Colonial for the past 12 years, was formerly superintendent of machine construction.

Jackson Kemper has been elected vice-president of **H. K. Porter Co., Inc.** In addition to his new duties, Mr. Kemper will continue as general manager, Watson-Stillman Fittings Div. of the company.



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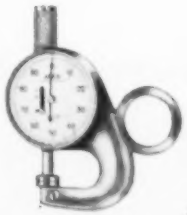

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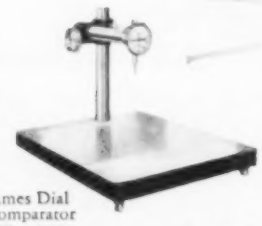

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Abstracts of Foreign Literature

By M. Kronenberg

Development in Machine Tool Controls and Copying Devices

In view of the high metal-cutting capacity of present day machine tools, which was initiated by the development of carbide tools and subsequent redesign of the machines for high spindle speeds, it has become increasingly necessary to cut down handling times because they grew out of proportion to the machining times.

O. Mohr, in a paper published in *Zeitschrift des Vereins Deutscher Ingenieure* of November 21, 1952, indicates that for these reasons more attention is being given to drive mechanisms and controlling elements. As an example, he describes the preselector method using punched cards for controlling speeds and feeds on a fine-boring machine and finds that in general the controls are not applied to the motors or other heavy masses but to gear trains and similar transmitting elements.

Braking of motors is attained, in another example, by shifting the tapered rotor in an axial direction. Among the mechanical controls, he discusses the electromagnetic clutches and indicates that cooling fins have been very successfully employed in keeping the temperature of motors down, particularly on planers.

The contouring or copying devices contribute substantially to the reduction of nonmachining time and often eliminate the time lost for measuring the dimensions of the workpiece. In the author's opinion, hydraulically operated copying devices are preferred in Germany while mechanically controlled mechanisms are preferred in the US. This statement seems to underrate the significance which hydraulically controlled copying devices have attained here. In Germany, according to the author, a hydraulic finger control is used on the Multicop and Bondycop tracers, while the some complex devices with electronic control are employed only on machines requiring high accuracy of tracing.

Hydraulic valves, in the author's opinion, cannot be made accurate enough while electrical media improve the accuracy. A combination of a mechanically operated double contact with an electromagnetic clutch is also

escribed. It is used for the control of wo motions along the contour. It is laimed that the disadvantages of two irectional motions are reduced by hav- ng the copying device moving at a 45- legree angle with respect to the center- ine of the work while the carriage noves parallel or square to the center- ine with adjustment in wide limits. By oupling the feed with the spindle ro- ation it is possible to reduce the feed and to cut in steps in the case of large diameter differences. Another example is quoted in the article discussing the use of two tools in the copying device and tracing along two templates. In this way it is not necessary to use two setups for contouring, as is sometimes required when the tool motion is limited to a 45-degree angle.

Special Lathe

H. Opitz, J. Kob and H. Hucks describe tests on a novel type of a special lathe for turning of heavy rolls in *Stahl & Eisen* No. 19, 1952. They discuss the requirements for design of machine tools operated with carbide tools and cover the life of tools per grind, surface finish, performance of machine in presence of vibrations and standard data for the turning of rolls on this machine.

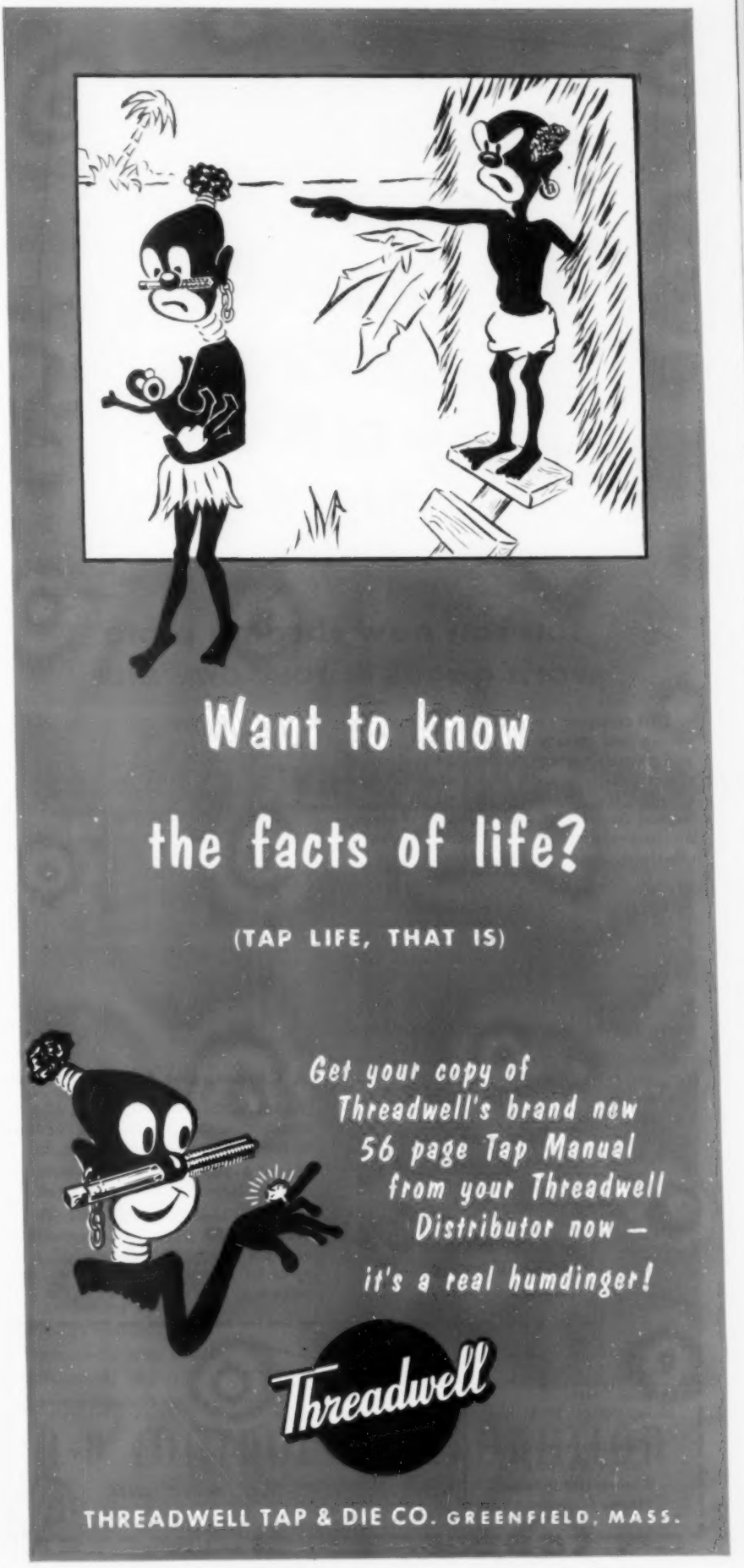
Upsetting Research

Research into the power and work requirements for cold upsetting operations has been carried out at the Aachen Institute of Technology, according to an article by J. Billigman in *Stahl & Eisen* No. 20, 1952. From these tests formulas have been developed for predetermination of the output and standard values derived for the strength and resistance to deformation. Ratios indicating the effect of the materials are given and calculations presented for the pressure required for upsetting work. Also diagrams and nomographs are included in the article eliminating calculations. It was found that the force required for upsetting operations increases with the square of the initial diameter of the workpiece and continues to increase with increasing deformation at an exponential rate. The power increases with the cube of the initial diameter.

Injection Molding Techniques

A survey of the development of injection molding techniques is given in an article by H. Beck in *Zeitschrift des Vereins Deutcher Ingenieure*, October 11, 1952. He describes the design and functioning of the machines and of their main elements, covering mechanical and hydraulic drives, hand-operated, semi-automatic and full automatic machines.

The injector units of different designs and the tools are discussed and dia-



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grams are included showing the pressure distribution in the injector units and compressor chambers.

Productivity Conference

Borderline cases which are of interest to the tool engineer and the industrial engineer were the topic of a productivity conference recently held in Switzerland by the Swiss Committee for Scientific Management (*Schweizerisches Kommittée fuer Betriebswissenschaft*). A large number of prominent representatives from industry, science and government presented papers covering the possibilities of increasing production and raising the standard of living in Europe. The American way of life, the Marshall Plan and American technical assistance were discussed and compared with the market conditions in Europe and means and ways to improve them. The papers which were presented by E. Speiser, R. Kristensson (Sweden), E. Schmidt and F. Streiff have been published in *Industrielle Organisation*, No. 11, 1952.

Human relationships in the machine and other shops, problems of incentives and wages were discussed and some time was spent in discussing the possibilities of common research in the field of metallurgy and production by several independent companies. This conference reflected very well the present trend in European production and indicated what we may expect in this respect in the future and how it could affect international relationships.

High-Speed Steel Tools

Sub-zero treatment of high-speed steel tools is used for converting austenite into martenite, but does not, in the opinion of F. Rapatz, constitute any substantial progress in heat treatment technique. He also discussed, in an article in *Werkstattstechnik and Maschinenbau*, No. 11, 1952, various others of the more recent methods for improving the life of high-speed steel tools. Among them is the so-called Bainite heat treatment, the heating by steam and bath nitriding. Tests which were run by the author indicated that the Bainite method produces a somewhat tougher microstructure in the tool but it is usually too expensive. Treatment with steam seems to be more promising.

The author comments also on the trend in American tool practice to use great quantities of Moly-tools and writes "We also hope that foreign countries, particularly the United States, will come to the conclusion that molybdenum could be used to better advantage elsewhere than in case hardening tools. According to our experience it is not necessary any more to use molybdenum, which is scarce in

ntral Europe, for case hardening ols." F. Rapatz favors cast tools, rticularly for milling cutters because ey offer high wear resistance.

orging Hammers

Tests have been made at the Hanover nstitute of Technology to determine the mpact load of forging hammers, as liscussed by K. Lange in *Werkstatts-echnik and Maschinenbau* of Novem-ber, 1952.

The main purpose of these tests was to ascertin whether the "Heim-Formula" for determining the forging capacity is sufficiently correct or whether it should be modified in view of the fact that it was first established about fifty years ago. The author indicates that the Heim method of compressing a lead cylinder is accurate, provided that recrystallization sensitivity of soft lead is taken into consideration. He has developed a modified formula which agrees better with the facts than the original formula. Numerous diagrams and illustrations supplement the article.

STOKES OPENS LABORATORY

A new laboratory representing an investment of more than $150,000 has been opened at the F. J. Stokes Machine Co. to provide complete facilities for testing and developing materials, equipment and processes for its customers.

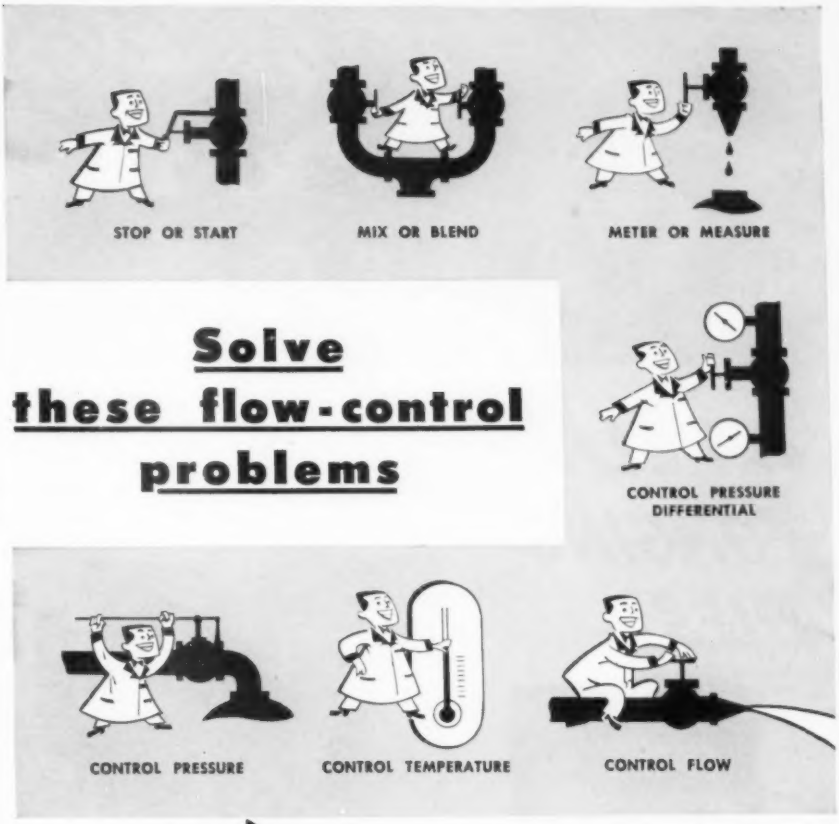
New dies and accessories, improved methods and experimental powdered metal mixtures and plastics compounds will undergo trial runs in a special section of the laboratory. This houses a representative selection of Stokes various types presses used in the plastics, ceramics and powder metallurgy.

In addition, a large portion of the space has been readied for pharmaceutical companies where they may work out new formulas requiring special mixing, granulating, coating and tabletting procedures.

Both these facilities are arranged in two open areas and five completely enclosed cubicles, where equipment and materials may be completely isolated. Each cubicle has its own independent control over temperature and humidity, making it possible to maintain any desired combination of conditions. The ceiling, said to be the first of its kind, is composed of corrugated and perforated aluminum sheet backed with glass fiber soundproofing.

Even before the laboratory was finished, projects in high vacuum processing, powder metallurgy, tabletting, plastics extrusion and molding were under way.

Dr. Earl W. Flosdorf, director of research and development at Stokes, and his two assistants, Joseph F. Piotrowski and William H. Hamilton, carry on the laboratory's work.



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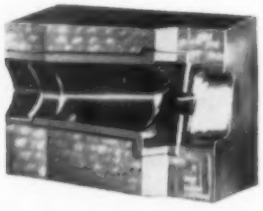
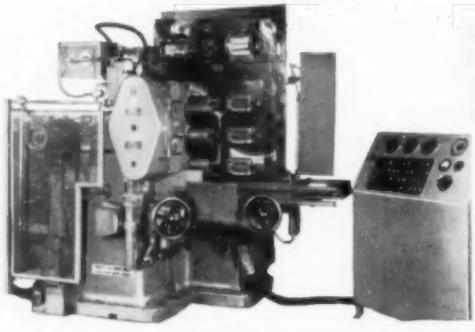
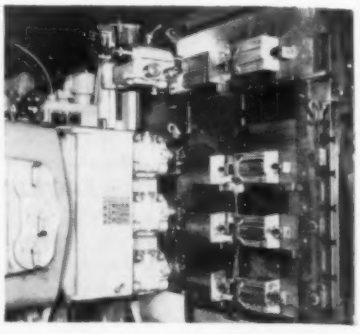
HERE IS THE COMPLETE P&W METHOD FOR MASS

JET BLADE FORGING DIES



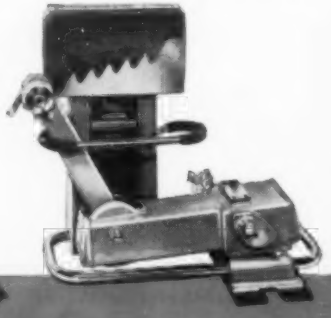
1 ROUGHING DIE BLOCKS with the PRATT & WHITNEY-KELLER MACHINE This P&W, Type BL-3620, 3-Spindle Keller Machine is performing the roughing operation on three male die halves at once; the female halves are similarly handled. Average machining time is only about 30 minutes per die half.

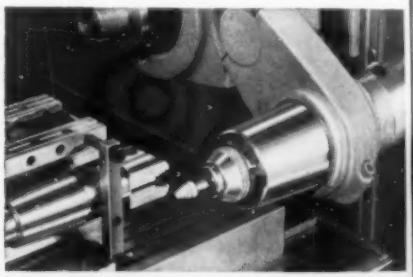




FINISHING JET BLADES

2 FINISHING THE FIR TREE FORM on ROOT SECTIONS or BLADE CARRIERS with wheels formed on the PRATT & WHITNEY DIAFORM Wheel Forming Attachment The fir tree form for this blade carrier is being ground with a wheel that was accurately formed to "tenths" in a few minutes with a Pratt & Whitney Diaform Wheel Forming Attachment. Grinding wheels for root sections are formed with equal speed and accuracy.





It's Logical to Look to PRATT & WHITNEY

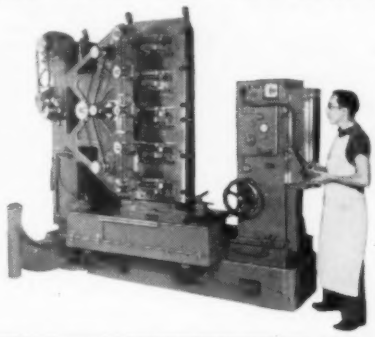
This example illustrates how a part of the diversified Pratt & Whitney Machine Tool line — backed up by P&W Gage and Cutting Tool Engineering Service — can break a critical production bottleneck. The jet blade production method shown here has been described by manufacturers using it as, "... by far the most accurate." What P&W has done for jet blade production it can do for your tough manufacturing problems.

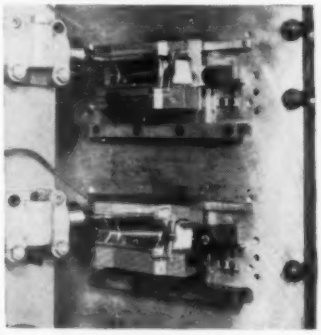
If you would like complete information about any of the equipment shown here — or if we can help you to solve a specific problem — write on your Company letterhead to the Pratt & Whitney Branch Office nearest you, or direct to West Hartford.

EANS RESULTS

PRODUCING AND FINISHING TURBINE BLADE AIRFOILS

2 FINISHING DIE BLOCKS TO ± .002 INCHES with the PRATT & WHITNEY AUTOMATIC DUPLICATING MACHINE The 4-Spindle Pratt & Whitney Automatic Duplicating Machine is finish machining a set of four female die halves for a deeply curved turbine bucket. Hand polishing is needed only to remove mill marks; no hand correction of airfoil shape is required. Average machining time is just over 30 minutes per die half.





3 CORRECTING DIES AFTER HARDENING

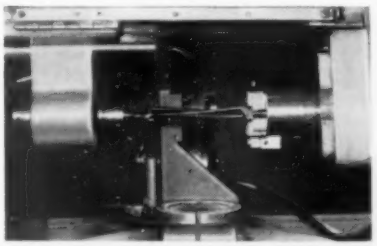
Dies are often unavoidably distorted in hardening to the usual Rockwell "C" 60-63. Since P&W Kellerflex Carbide Burs are used in this machine, these dies can easily be replaced in the P&W Automatic Duplicator and re-cut if necessary.

2 GAGING FIR TREE FORMS with the PRATT & WHITNEY AIR-O-LIMIT GAGE

Checking fir tree forms for pitch diameter with this P&W Air-O-Limit Gage is far faster and more reliable than the previous method of checking over wires with a hand micrometer. Air-O-Limit Gaging is available for both blade and carrier forms.

3 FINISH GRINDING AIRFOIL SECTIONS TO ± .003 INCHES PRATT & WHITNEY TURBINE BLADE AIRFOIL GRINDER

The *entire* twisted and irregular airfoil section of this blade—including leading and trailing edges—is being ground in a single automatic operation on a P&W Airfoil Grinder. A fine finish with closely maintained tolerances is produced.



PRATT & WHITNEY

DIVISION NILES-BEMENT-POND COMPANY

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First Choice for Accuracy

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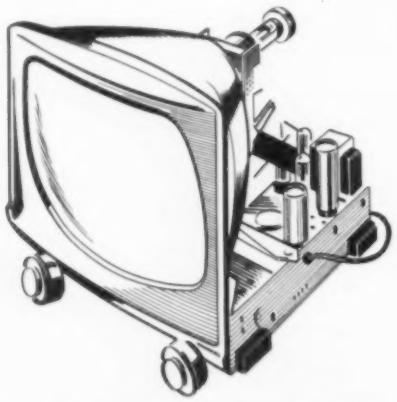
MACHINE TOOLS • CUTTING TOOLS • GAGES

UNBRAKO SELF-LOCKING SOCKET SET SCREWS feature the following advantages: knurled cup point that won't work loose; accurate hex socket for nonslip, positive drive; fully formed threads—Class 3 fit; heat treated alloy steel for strength; standard sizes—# 4 to 1"—in a full range of lengths.



USE UNBRAKO SELF-LOCKING SOCKET SET SCREWS wherever ordinary cup point set screws are used... on radios, television sets and electronic equipment.

On refrigerators, washers, other household appliances

Our Fiftieth Year : A START FOR THE FUTURE

9 times out of 10 a standard UNBRAKO will do the job

A special socket screw may not be necessary, a standard UNBRAKO usually does the same job—much cheaper. Your local industrial distributor stocks Standards. He gives immediate attention to your requirements, and such extras as special delivery to your plant. Write for a copy of UNBRAKO Standards. SPS, Jenkintown 37, Pa.

UNBRAKO® SOCKET SCREW DIVISION

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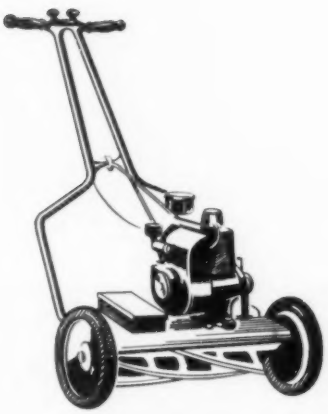

On power mowers, power saws and other power tools.

UNBRAKO Standards—as listed in the SPS Catalog—are stocked by leading industrial distributors everywhere.

Correct MISALIGNMENT
with the ERICKSON FULL FLOATING HOLDER

MODEL 189
COLLET TYPE
(illustrated)
gives both
PARALLEL ADJUSTMENT
and ANGULAR ADJUSTMENT

With the Full Floating Holder, another of the Erickson family of Precision Holding Tools, work and cutting tools may be quickly and easily adjusted to offset machine errors.

This Precision Holder compensates for *both* parallel and angular misalignment with the work spindle through the use of mechanical principles never before utilized in any floating holder.

Designed for floating reamers, taps, die-heads and all other chuck-held cutting tools, the versatile Erickson Full Floating Holder will help you increase production, reduce scrap, and lower tooling costs. A-6094

Available in Taper, Bushing and Erickson Collet Types

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Catalog A: *Precision Collet Chucks*

Catalog B: *Adjustable and Full Floating Holders*

Catalog C: *Precision Tap Chucks*

Catalog D: *Speed Chucks and Air Operated Cylinders*

Catalog E: *Precision Expanding Mandrels*

Catalog F: *Speed Indexers*

Catalog G: *Boring and Reaming Tools*

ERICKSON TOOL COMPANY

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ARTILLERIE-INRICHTINGEN

High Quality Super Precision MACHINE TOOLS

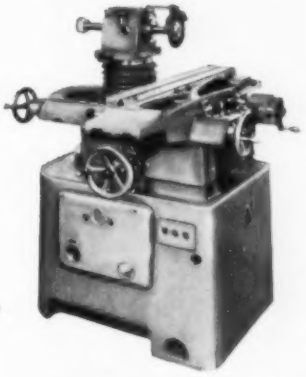
UNIVERSAL TOOL & CUTTER GRINDER

The AI Model U. 1. is specially built for those industries where the demand is for constant accuracy and high precision grinding of cutting tools and for general toolroom work. Ideal for cutters, mills and reamers. Particularly suitable for cylindrical, surface and internal tool room grinding.

MAIN SPECIFICATIONS

Table size .....35½"x5⅛"	Distance between plain centers .....27½"
Table travel, longitudinal .....16⅛"	Swing on plain centers ..... 11"
Saddle travel, cross ..... 8⅝"	Wheel speeds ..... 3000/6000 r.p.m.
Wheel head travel, vertical .....10½"	

Attachments available for Heavy Duty Cylindrical, Internal, Radius, Long Reamer and Universal Hob Grinding.



U. 1

PRECISION TOOLMAKERS LATHE

The AI Model DR. 1. L. meets the most exacting requirements of the toolroom for lasting accuracy, precision and efficient production.

MAIN SPECIFICATIONS

Swing over ways .....10⅝"	Sixteen spindle speeds ....45—2200 r.p.m.
Swing over cross slide ..... 5⅝"	Longitudinal carriage feed .0009"—.100"
Distance between centers ..... 30"	Automatic cross feeds ..... .0003"—.033"
Hole in spindle ..... 1"	Main motor, two speed....1 and 1½ H.P.
Quick change gear box will cut 2—90 pi.	

Attachments available for Coolant, Universal Indexing, Fast Thread Cutting, Taper Turning, Hydraulic Copying, etc.

DR. 1.L.

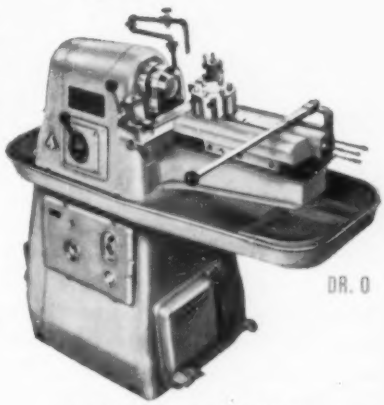
HIGH SPEED PRODUCTION LATHE

The AI Model DR.O. is a hand operated screw machine for bar work up to ¾" diameter and a second operation lathe for finishing small work pieces. The roller turret slide construction assures a sensitive, accurate operation.

MAIN SPECIFICATIONS

Hole through spindle .....25/32"	Effective stroke of turret slide ..... 4"
Maximum capacity push type collets .....⅞" dia.	Number of spindle speeds, forward and reverse 12
Swing over ways .....10½"	Range of spindle speeds 335 to 5300 r.p.m.
Swing over cross slide ..... 7⅛"	Main motor, three speeds.....1, 1¾ and 2½ H.P.
Cross travel of compound rest ..... 4"	
Maximum distance face of spindle to face of turret ..... 9"	

Attachments available for Bar Work, Pneumatic Foot Control for High Production, Coolant, etc.



DR. O

All machines equipped with graduations and electrical controls to fit American requirements. Service and replacement parts for all machines.

Write—Wire—Phone for catalogs, prices and demonstration at our showrooms.

Exclusive Importers for the U.S.A. and Canada:

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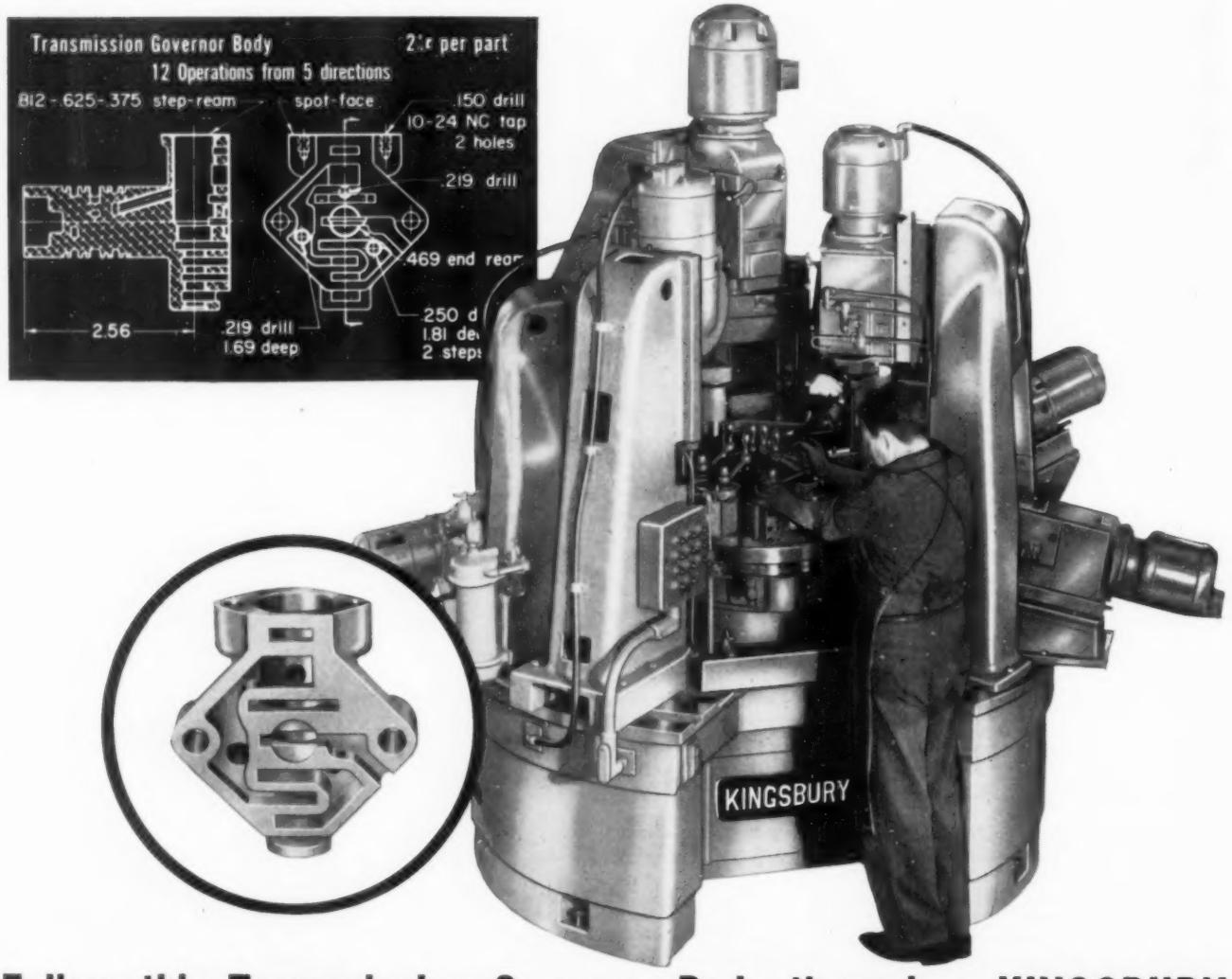
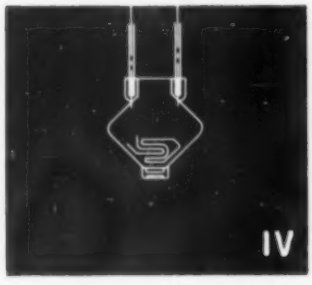
SALES TERRITORIES OPEN

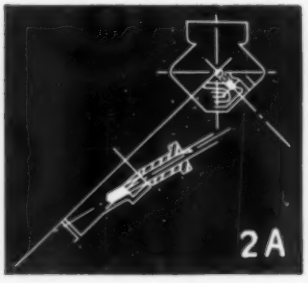
PROMPT DELIVERY
NO PRIORITY
REQUIRED

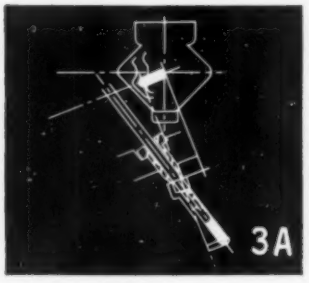
Every few seconds your Kingsbury will

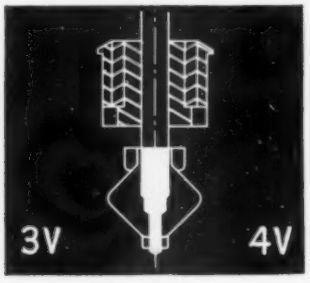


Follow this Transmission Governor Body through a KINGSBURY









Designing a Kingsbury to drill, ream, tap and spot-face this die cast aluminum Transmission Governor Body presented some interesting problems. Units at six stations perform 12 operations from five directions and produce 360 parts per hour gross. There are four vertical (V) units, four angle (A) units, and one horizontal (H) unit. Let's follow the part in its cycle through the machine.

At Station 1, Unit 1-V drills two .150 holes.

Station 2 has two units. Unit 2-A spot drills .250 hole .500 deep at an angle of 10° uphill and 9° right of center line through the work fixture. Note the guide bushing. Unit 2-V (not sketched) operates a 1.750 spot-facing tool.

Stations 3 and 4: Unit 3-A drills .219 hole 1.69 deep at an angle of 6° uphill and 15° left of the center line through the work fixture. Unit 3-V (the tallest) has a 2-spindle auxiliary head with one spindle operating at Station 3 and the other at Station 4. Jergens rotary bearings guide these tools. Spindle 3-V end-reams a hole .782-.595-.331. Spindle 4-V finish-reams the hole .812-.625 .375. At Station 4, Unit 4-H operates a .469 end-cut reamer .11 deep.

The operation at *Station 5* is something special. It was interesting to

deliver another finished part—at low cost

Kingsbury Machine Tools soon pay for themselves in high production runs

Each Kingsbury is designed and built to perform certain operations accurately and automatically. Work fixtures on an index table hold the parts and present them to the various operating units in turn. These units of ½ to 5 hp drill, ream, c'bore, mill, tap, thread, etc.

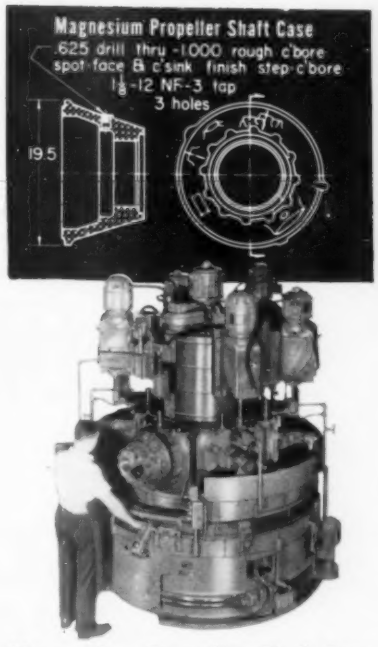
These combined operations cut unit costs in several ways:

1. Increased production per man-hour.
2. Almost no scrap loss. Each part is machined uniformly to specifications.
3. Less floor space than required for separate machines.
4. Less handling of parts.

This is only part of the story. Do you want the rest?

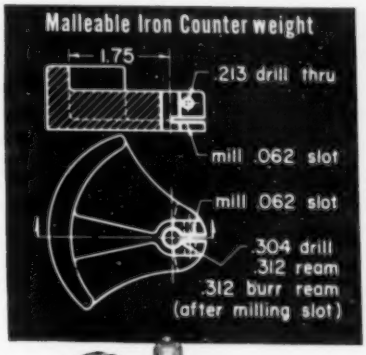
Kingsbury Machine Tool Corp.
100 Laurel St., Keene, N. H.

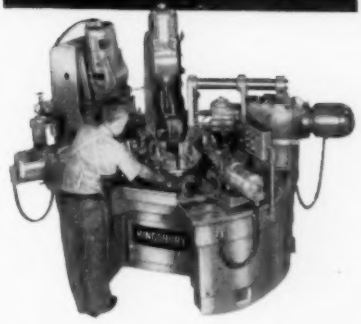
KINGSBURY
AUTOMATIC DRILLING AND TAPPING MACHINES
for Low-Cost High Production



Magnesium Propeller Shaft Case
90 parts per hour gross
13 9/10¢ per part

Here is an unusual application of a Kingsbury with central column. Five vertical units perform the same five operations on three holes in three passes around the machine. Each part is chucked in three fixtures, one at a time, to locate it for the three holes. This rechucking saves two machines.

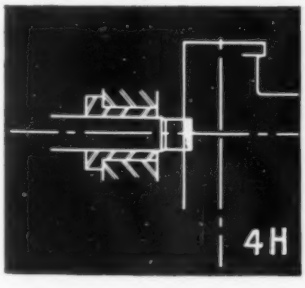


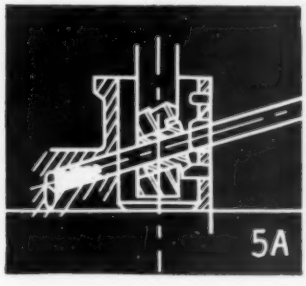


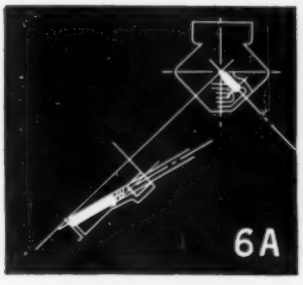
Counterweight—3¢ per part
200 parts per hour gross

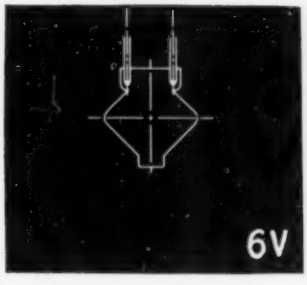
This Kingsbury performs six operations from two directions. It drills two holes, mills two slots, and reams the two holes. Parts are clamped in seven fixtures on a 20-inch dia. index table; two vertical and four horizontal units perform the operations at six working stations.

as it produces 360 parts per hour gross—at 2 4/10¢ each









work out, and naturally we are proud of the result. The job required a .219 hole starting from the inside of the .812 reamed hole. It was necessary to introduce a guide bushing into this larger hole.

You can't see it in the photograph, but there is a lever controlled by the outside path of the regular feed cam that actuates a vertical ram mounted on the column. This ram holds a guide bushing which is moved directly downward into the .812 hole in the work. As soon as it is in place, the .219 drill drills the angular hole.

Station 6 has two units. Unit 6-A completes the drilling of the .250 hole started at Station 2-A. Unit 6-V with two 10-24 NC taps, performs the tapping operation in the two holes drilled by Unit 1-V.

The work fixture is unclamped automatically as the table indexes to the unloading station.

Each Unit Cost on the drawings includes the cost of the man and of the machine — no power or overhead. We assumed:

Unit cost of man equal to:

$$\frac{\text{average U. S. hourly wage}}{\text{hourly gross x 80\% efficiency}}$$

Unit cost of machine to be:

$$\frac{\text{price of tooled machine}}{\text{output in 6000 hrs. @ 80\% efficiency}}$$

For Extreme Accuracy

You Can Depend on

JOHANSSON GAGING EQUIPMENT

It Assures You Precision to the Finest Degree, — to Meet Your Most Exacting Requirements — Backed by the Name Supreme in the World of Measurement.

- **GAGE BLOCKS**
  (JOHANSSON) and accessories. Short deliveries. Inspection and reconditioning service available at our plant
- **INTERNAL INDICATORS**
  (or inside measurements. 155 to 24 inches) Scale range plus or minus .001 graduated to .0001 and minus .020 graduated to .0001.
- **MIKROKATOR**
  (Amplifier — for outside measurements) Graduations .0001 to .000002 or .001 M to .0002 M
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  Micrometers, Snap gages, Extensometers, Dynamometers, Hardness Testers, Surface Finish Indicators

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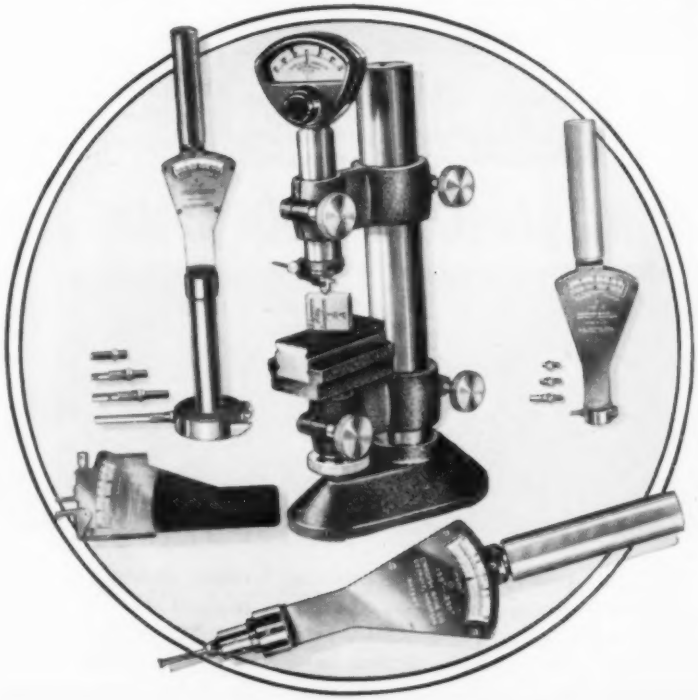


C. E. JOHANSSON GAGE CO.

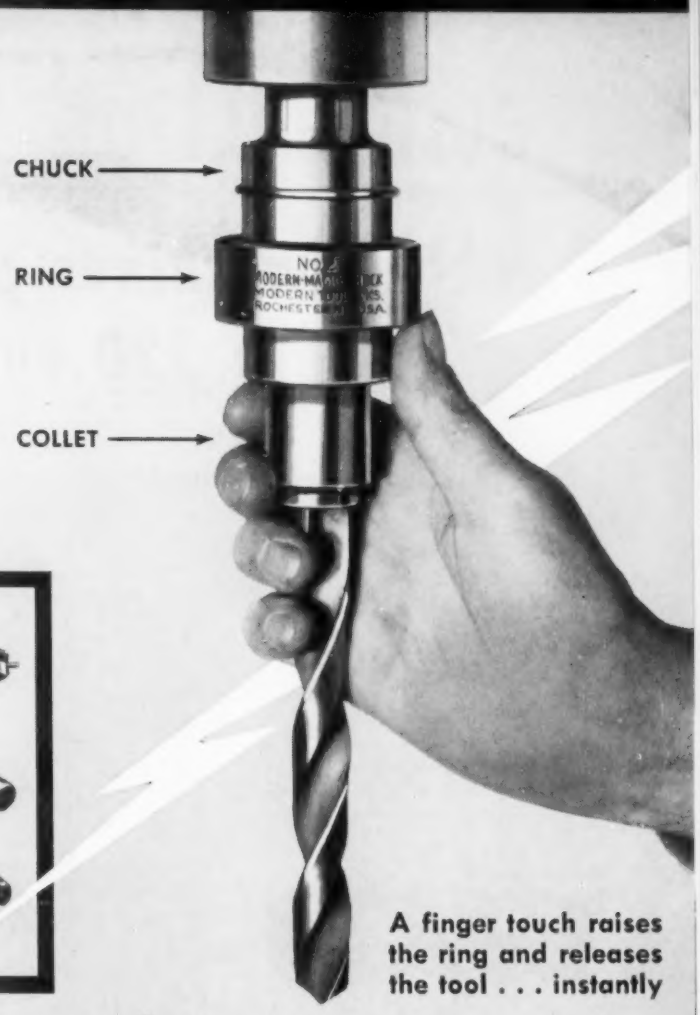
(A DIVISION OF SWEDISH GAGE CO.)

10641 Haggerty Ave., Box 4086 Northeastern Station, Dearborn 1, Mich.

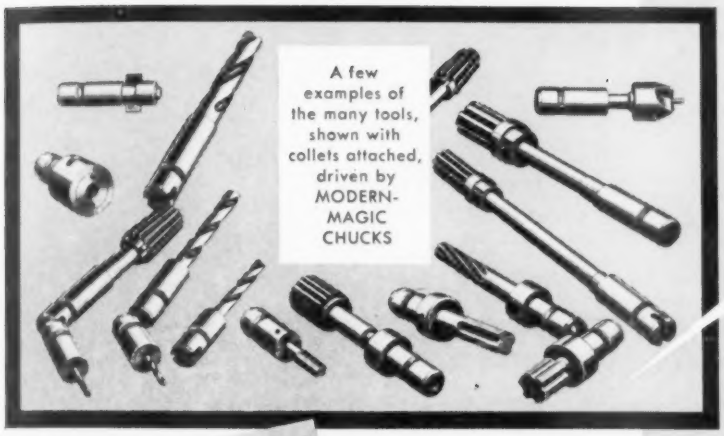
Speed up your production

Change tools without stopping . . . or even slowing the machine

MODERN-MAGIC QUICK CHANGE CHUCK and COLLET EQUIPMENT



A finger touch raises the ring and releases the tool . . . instantly



A few examples of the many tools, shown with collets attached, driven by MODERN-MAGIC CHUCKS

Modern Precision Tools Include . . . . .

- STATIONARY SELF-OPENING DIE HEADS
- ROTARY SELF-OPENING DIE HEADS
- STATIONARY COLLAPSIBLE TAPS
- ROTARY COLLAPSIBLE TAPS
- MODERN-MAGIC CHUCKS AND COLLETS
- SELF-OPENING STUD SETTERS
- INSERTED BLADE FACE MILLING CUTTERS
- SOLID ADJUSTABLE DIE HEADS
- ADJUSTABLE HOLLOW MILLING TOOLS
- UNIVERSAL CHASER GRINDING FIXTURES

Modern-Magic Quick Change Chuck and Collet Equipment virtually eliminates costly lost time of revolving spindle machines. Used with such machines, tools are changed without stopping or even slowing the spindle. Changes are made from drill to reamer to tap instantaneously and safely while the machine is running at cutting speed. In this way, the Modern-Magic Chuck and Collet Equipment gives multiple spindle range to single spindle machines, increasing production and cutting cost. In high production shops, it has been proved they save time even though used only for changing from dull to sharp tools.

For full information, send for Bulletin M-103. In addition to standard Modern-Magic Chucks and Collets, it shows special types of each.

Only the ORIGINAL Modern-Magic Chuck and Collet Equipment carry the name "MODERN-MAGIC" and are manufactured by Modern Tool Works, Rochester, N.Y.

MODERN TOOL WORKS

DIVISION

CONSOLIDATED MACHINE TOOL CORPORATION

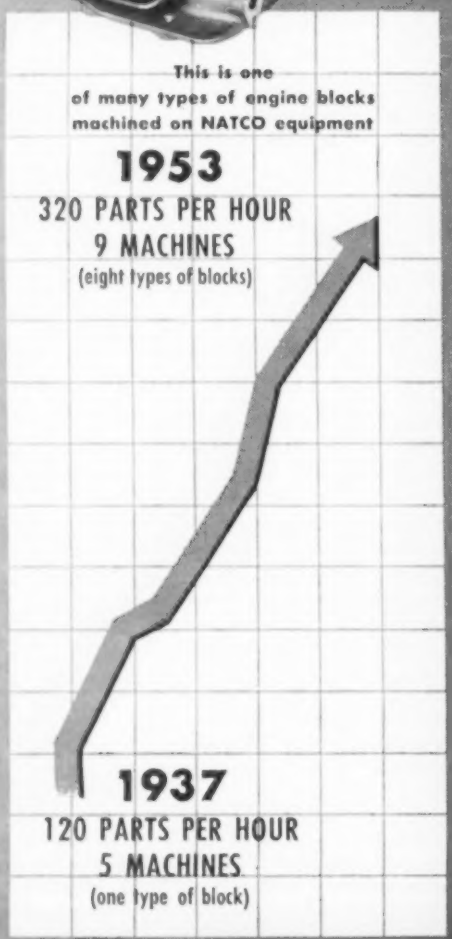
SUBSIDIARY OF FARREL-BIRMINGHAM COMPANY, INCORPORATED

ROCHESTER, NEW YORK

well known manufacturer produces record MILLION ENGINES in 1952

9 NATCO machines produce all holes in 320 engine blocks per hour

Here are the facts...



Back in 1937 a well known engine manufacturer installed four large NATCO Station Machines and a tapper. These machines performed a total of 170 operations on 120 engine blocks each hour. Modifications increased production to 140 blocks per hour on any of eight types of engines.

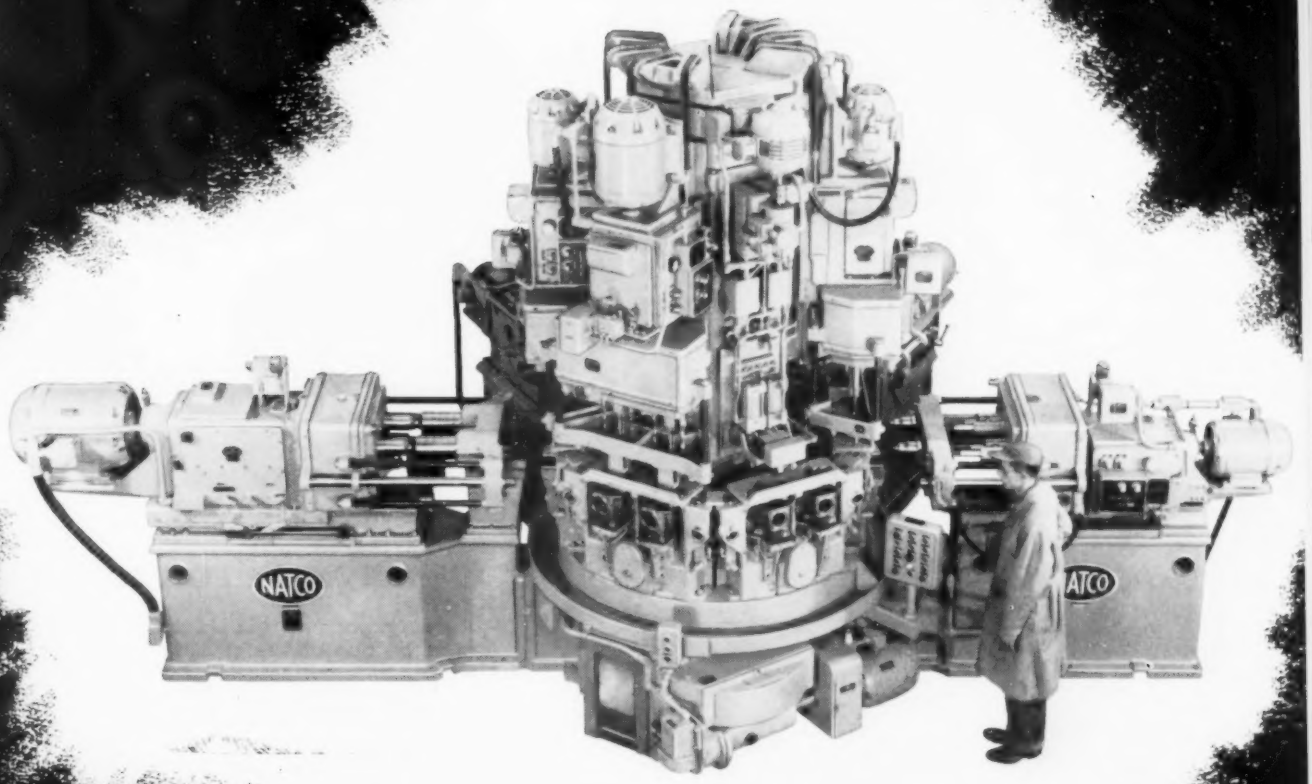
In 1951 this engine manufacturer added four new NATCO Station Machines to their production lines. These new machines performed the same operations on 180 engine blocks per hour on any of eight different blocks.

Here again is another example of a NATCO engineered production installation proving successful and additional equipment being added to further increase production and to lower costs.

LET NATCO ENGINEERS SOLVE YOUR "HOLE" PROBLEM

ROCHESTER, NEW YORK

NATCO ENGINEERED
for quality and quantity production



One of 9 similar NATCO Station-type Machines helping to make this production record possible.

Call a Natco Field Engineer

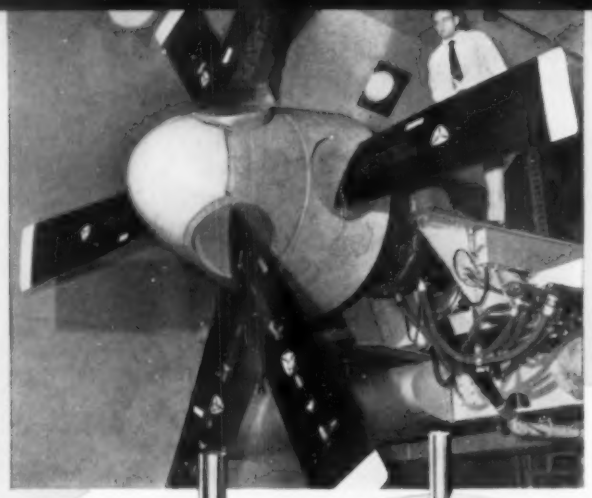
to help you solve your problems in Drilling, Boring, Facing and Tapping.

NATCO

NATIONAL AUTOMATIC TOOL COMPANY, INC., Richmond, Indiana

Branch Offices

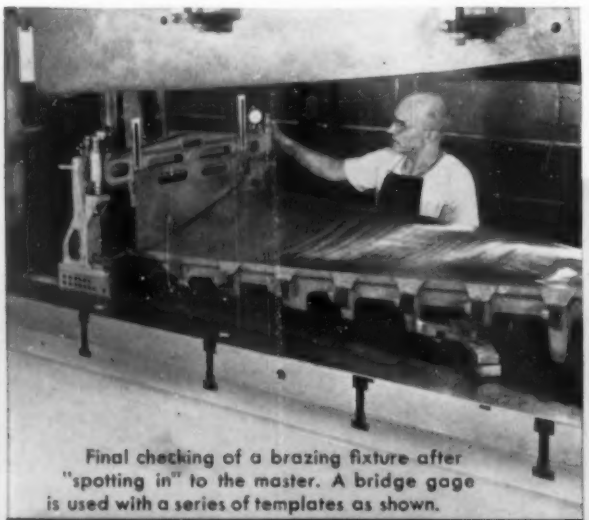
1809 Engineering Bldg., CHICAGO • 409 New Center Bldg., DETROIT
1807 Elmwood Ave., BUFFALO • 2902 Commerce Bldg., NEW YORK CITY



High speed aircraft propeller on test stand—built from tools "spotted in" in a DANLY SPECIAL DIE SET.

DANLY SPECIAL DIE SET, 46 by 140 inches, used for both production and checking of aircraft propeller tools.

DANLY SPECIAL DIE SETS



Final checking of a brazing fixture after "spotting in" to the master. A bridge gage is used with a series of templates as shown.

DANLY®

DIE SETS AND DIEMAKERS' SUPPLIES

DEPENDABLE FOR ACCURACY

Here's proof . . . this Danly Special Die Set is used by one of the country's leading aircraft propeller manufacturers for "spotting in" all contour tools for a complete production line. Accuracy is a must because the tools, masters for duplicating planers and profilers as well as holding fixtures, must mate closely with the master pattern and with each other in the sequence of operations.

Dependable accuracy makes Danly Special Die Sets ideal for applications of this kind . . . and rugged construction makes them last longer, too, on any job. That's why leading diemakers everywhere prefer Danly Die Sets!

DANLY MACHINE SPECIALTIES, INC.

2100 South Laramie Avenue • Chicago 50, Illinois

DANLY SPECIAL DIE SET SERVICE IS FAST AND CONVENIENT—CALL YOUR NEAREST DANLY BRANCH

*CHICAGO 50 — 2100 South Laramie Avenue
*CLEVELAND 14 — 1550 East 33rd Street
*DAYTON 7 — 3196 Delphos Avenue
*DETROIT 16 — 1549 Temple Avenue
*GRAND RAPIDS — 113 Michigan Street N.W.
INDIANAPOLIS 4 — 5 West 10th Street
*LONG ISLAND CITY 1 — 47-28 37th Street
*LOS ANGELES 54 Ducommun Metals & Supply Co., 4890 South Alameda
MILWAUKEE 2 — 111 East Wisconsin Avenue
*PHILADELPHIA 40 — 511 W. Courtland Street
*ROCHESTER 6 — 33 Rutter Street

*Indicates complete stock

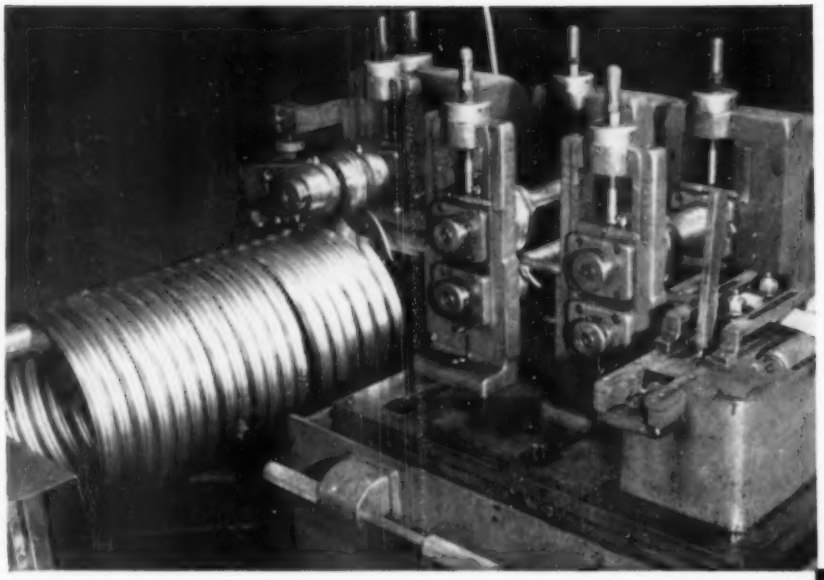
Every tiny bit of JESSOP steel is bigger than its job

There's a very simple reason for Jessop's fine reputation as a specialty steel maker. Jessop not only controls its formulae and processes with infinite care, it traditionally strives to produce better steel of each type than the end-use necessitates. Take, for example, the high-speed tool bits shown here. They cut harder materials faster and deeper than their basic analysis indicates, thus providing longer life and greater durability on normal jobs. Behind this tradition for extra quality is the keen desire for more business on the part of the Jessop producing and selling team. Every single Jessop man wants more satisfied customers. He wants them to be so enthusiastic they will forget there is anyone else in the world making special steels. Some customers already have.

HIGH SPEED STEELS · HIGH SPEED BITS · PRECISION GROUND FLAT STOCK · HIGH SPEED AND ALLOY SAW STEELS · HOT WORK DIE STEELS · COLD WORK DIE STEELS · CARBON AND ALLOY STEELS · GROUND AND TEMPERED PRODUCTS · STAINLESS AND HEAT RESISTING STEELS · STAINLESS-CLAD STEELS · CAST-TO-SHAPE STEELS · COMPOSITE TOOL STEELS · ARMOR PLATE

JESSOP

STEEL COMPANY · WASHINGTON, PA.

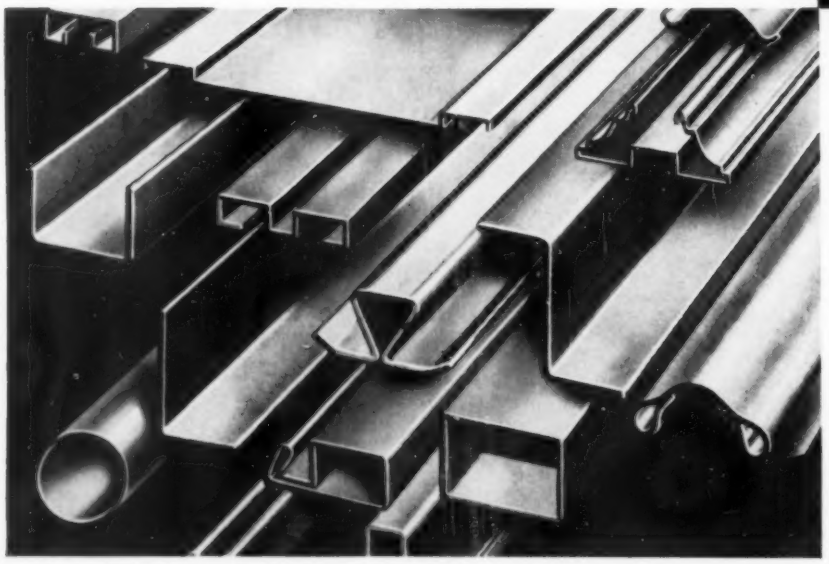


CURVING and coiling to almost any diameter, are two out of many operations which can be performed in a Yoder roll forming machine. As fast as formed, the sections can be continuously coiled and cut to length to make rings for auto hub caps, headlights, wheel trim, stator rings, etc., at a huge saving in cost of materials and labor.

Among other operations which can be tied in with cold roll forming may be mentioned embossing, notching, perforating, welding, flattening, lock-seaming, filling and closing tubular shapes, wrapping, edge trimming, etc.

Curving Coiling and Ring Making

IN A COLD ROLL FORMING MACHINE



In the design and assembly of production lines of this character, the know-how of the Yoder engineering staff is at your service. The Yoder book on Cold Roll Forming deals broadly with the most important phases of the subject. Ask for it.

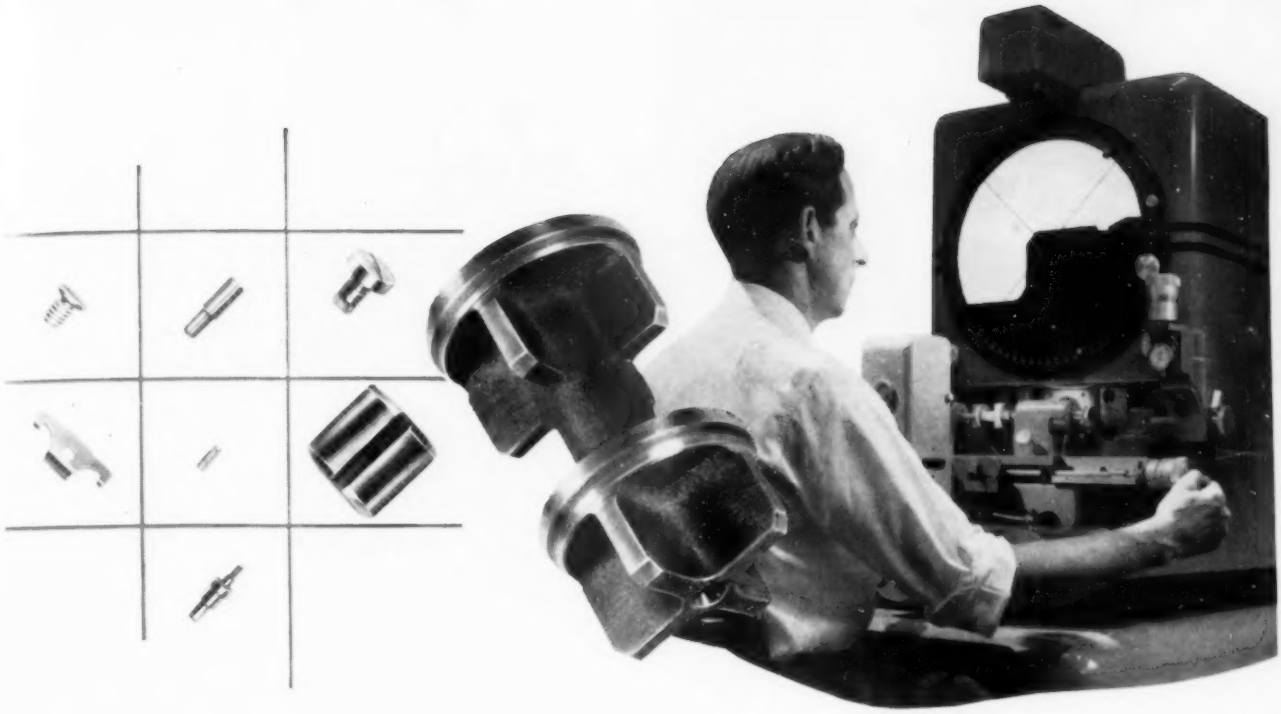
•

THE YODER COMPANY
5525 Walworth Avenue
Cleveland 2, Ohio

Complete Production Lines

- ★ COLD-ROLL-FORMING and auxiliary machinery
- ★ GAND SLITTING LINES for Coils and Sheets
- ★ PIPE and TUBE MILLS–cold forming and welding

ENGINEERING YODER MANUFACTURING



These parts help give Weston instruments their accuracy... they're checked on Kodak Contour Projectors

There is such a great variety of Weston instruments to measure all sorts of variables in all sorts of ranges that production on most individual items is small.

This creates a parts inspection problem. Precision requirements in many cases are so stringent that any measurable deviation from specifications is too big. Setting up toolroom instruments takes too long for the small volume of work being checked at any one time. Mechanical gages are even less economical at the low volume levels, and they just did not give the required accuracy on such jobs as checking the shoulder angles, concentricities, and specifications of the double-acting valve body shown above. (It goes in a recording thermometer and Weston makes it in many different sizes.)

Now Weston has converted to Kodak Contour Projectors. An inspector merely picks up the specification sheet covering a given part, gets the chart gage indicated there, puts it on the screen of the projector, and proceeds to sample according to specifications. Often, as with the valve body, gage blocks are used to step off the traverse of the projector work table. The inspector notes whether a shadow image coincides with a chart line after the table has carried it by the specified distance.

Possibly your inspection problems are volume and speed rather than the flexibility that Weston wants. In that case you will want to know about the Kodak Contour Projector, Model 3, which is designed for use with special staging fixtures instead of a moving work table. There is a field engineer in your area who can show you which model best fits your problem. To get in touch with him, just drop a note to *Eastman Kodak Company,* Industrial Optical Sales Division, Rochester 4, N. Y.

the KODAK CONTOUR PROJECTOR

Optical Gaging

A new sound movie shows how to simplify complex inspection problems. We'll tell you how to get it for a showing.

Kodak
TRADE-MARK

· Reduce tool inventory
· Increase cutter life
· Save regrind time

with Madison cutters' one screw adjustment!

After many regrinds Madison cutters can be re-set to size within the expandable range of the cutter. Many times one Madison cutter can be used for several different jobs.

It's not necessary to regrind Madison cutters to exact tolerances. Just sharpen the cutting edges . . . then set to the exact size you need for the job.

In a Madison cutter there's no chance of off-center adjustment . . . both edges cut equally — lengthening cutter life.

Write for your copy of the fact-packed Madison catalog.

MADISON MANUFACTURING COMPANY
Dept. TE — Muskegon, Michigan

USE READER SERVICE CARD; INDICATE A-3-202-1

STADOIL
MAKES DIAMOND WHEELS
SHARPEN MORE TOOLS!

STADOIL Diamond Lapping Oil removes load and glaze. It enables you to get on the diamond cutting edges down to the last diamonds. And since no pressure is needed to sharpen, all scratching of tools is eliminated.

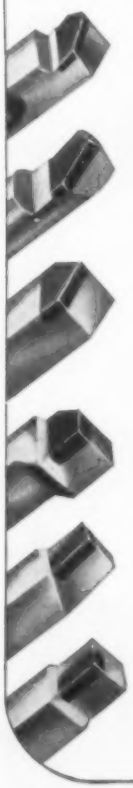
Diamond wheel manufacturers are unanimous in recommending STADOIL for carbide tool grinding. Excellent as a thinner for diamond lapping compounds to speed lapping. In use for 18 years . . . specified by 6900 plants.
STADOIL is sold in half-pint to 50-gallon containers. If your industrial distributor can't supply, order direct.

For full details, write Dept. 5

STADOIL MANUFACTURING CO.
EL MONTE 1, CALIFORNIA, U.S.A.

USE READER SERVICE CARD; INDICATE A-3-202-3

A FEW "POINTS" TO REMEMBER



When in need of the best in Carbide tools remember to specify "NORTH-WEST"!

▲ Consistent performance regrind after regrind!
▲ LOOK for this mark of quality

Full-size tips, uniformly brazed, have diamond ground cutting edges. "North-West" tools are tipped with Carboloy cemented Carbide.

Many of your requirements can be met by altering standard tools from stock!

Precision built, flat, single point, carbide cutting tools.

Carbide cutting tools made to your own specifications.

A complete line of Standard Carbide cutting, turning and boring tools. Available immediately from stock.

Distributors in all leading cities.

Write for catalog.

THE NORTH-WEST TOOL COMPANY
10 North Kilmer St., Dayton 7, Ohio

USE READER SERVICE CARD; INDICATE A-3-202-2

More PRACTICAL THAN ORDINARY TOOL HOLDERS

Types to fit any machine used for tapping or reaming.

On tapping and reaming jobs, you'll never know how much more practical a Ziegler Tool Holder is than ordinary tool holders until you actually use it and see how much easier it is to make set-ups with the Ziegler.

Imagine being able to make a set-up that, even though slightly inaccurate, enables you to turn out work to the finest of tolerances! With a Ziegler Holder the work can be as much as 1/32" out of alignment with the spindle on the radius or 1/16" off center on the diameter and the Ziegler Holder automatically compensates for the inaccuracy.

As a result, it takes much less time to make a set-up with a Ziegler Tool Holder than with an ordinary tool holder. You'll find that the labor costs saved will pay for the Ziegler Holder over and over again in a remarkably short time.

W. M. ZIEGLER TOOL COMPANY
13574 AUBURN — DETROIT 23, MICH.

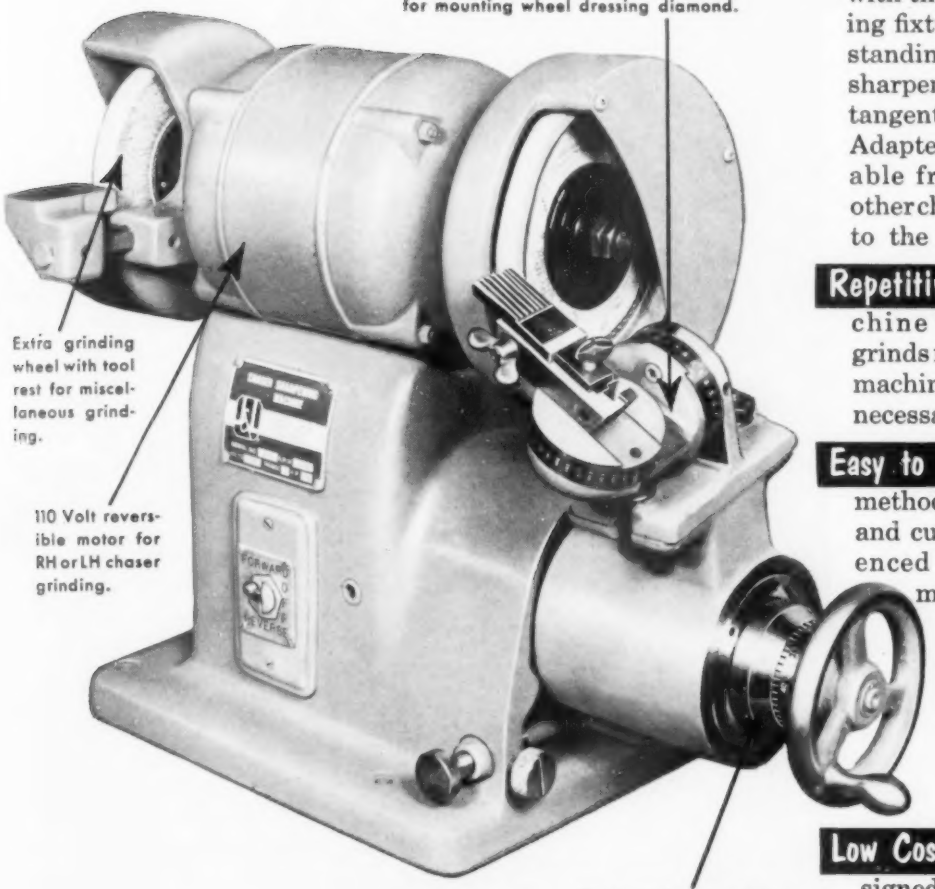
Ziegler ROLLER DRIVE FLOATING HOLDER for Taps and Reamers...

WRITE FOR CATALOG

USE READER SERVICE CARD; INDICATE A-3-202-4

JONES & LAMSON
UNIVERSAL BENCH TYPE
CHASER SHARPENING MACHINE

Specifically designed to resharpen chasers, this *Low Cost,* space saving machine allows you to free heavy expensive machine tools for their intended uses, and at the same time do a better job of chaser sharpening. *It's good for miscellaneous small tool and cutter grinding too.*


J & L Universal Grinding Fixture with tangent chaser. Basic fixture has provision for mounting wheel dressing diamond.
Extra grinding wheel with tool rest for miscellaneous grinding.
110 Volt reversible motor for RH or LH chaser grinding.
Graduated micrometer dial to control infeed.

Grinder set up to resharpen J & L Tangent chasers

Universal Application Equipped with the new J & L chaser grinding fixture and adapters, an outstanding job will be done on all sharpening operations, for both tangent and radial die chasers. Adapters for J & L chasers available from stock. Adapters for other chasers can easily be applied to the chaser grinding fixture.

Repetitive Accuracy This machine will duplicate desired grinds repeatedly. It is a precision machine tool equipped with all necessary stops and controls.

Easy to Operate Simple, direct methods speed up the operation and cut costs. Even an inexperienced operator can, in a few minutes, learn to resharpen chasers on this machine.

Saves Space BENCH SPACE 14 x 28 inches is ample for your complete chaser resharpening operation.

Low Cost This complete unit, designed to do your entire chaser resharpening job, sells for only a small fraction of the cost of other bulkier machines often used. Why not install one in your plant, and release your heavier, bulkier machines for their intended uses?

P.S. *Because of its size this machine can well be a time saver in shops where cutter grinding rooms are at distant points from the machines where dies are used. Write Dept. 710G for further details.*

JONES & LAMSON

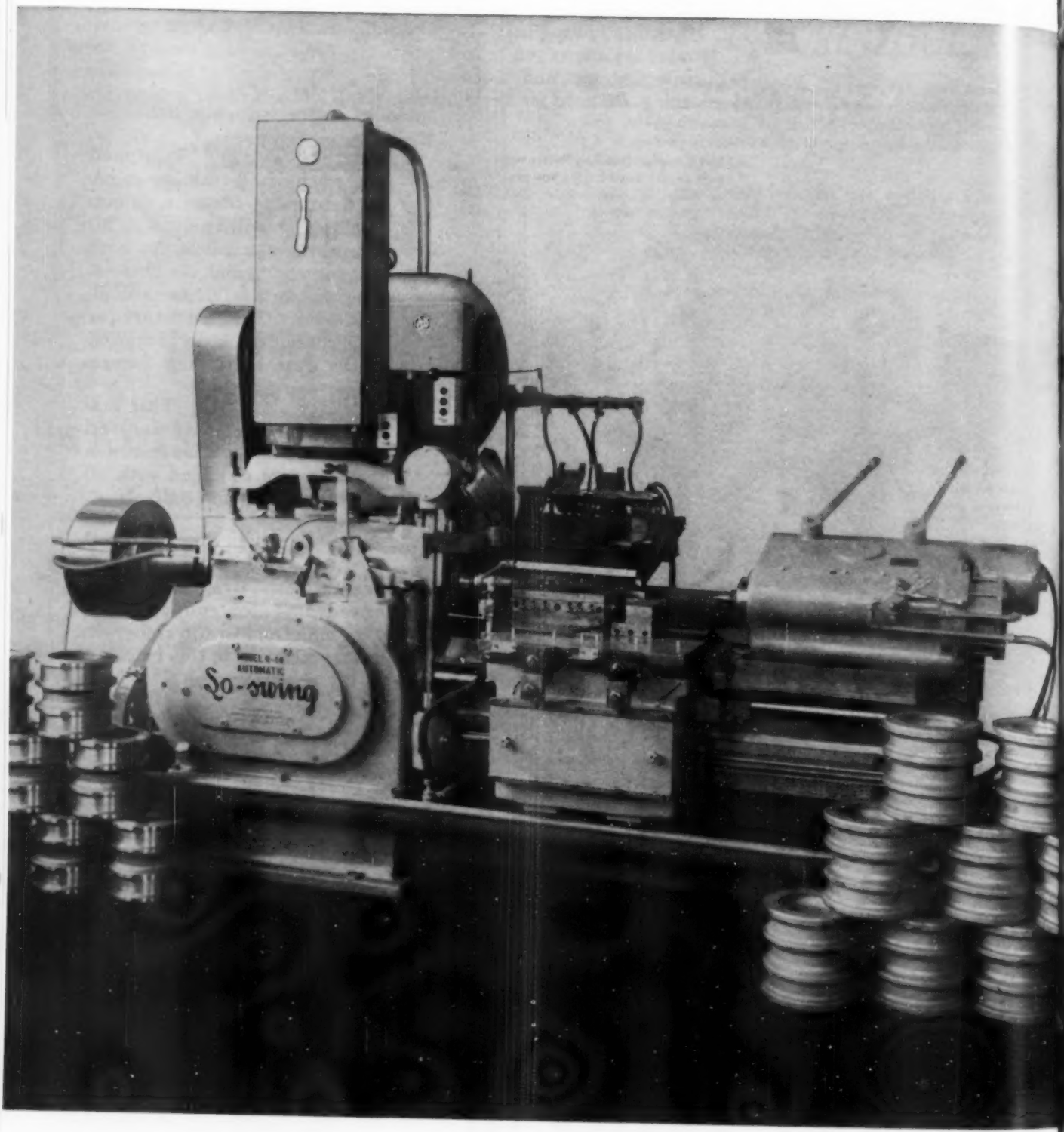
Machine Tool Craftsmen Since 1835

JONES & LAMSON MACHINE CO., 518 Clinton St., Dept. 710, Springfield, Vt., U.S.A.

DIE HEAD DIVISION

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-203

MACHINE OF

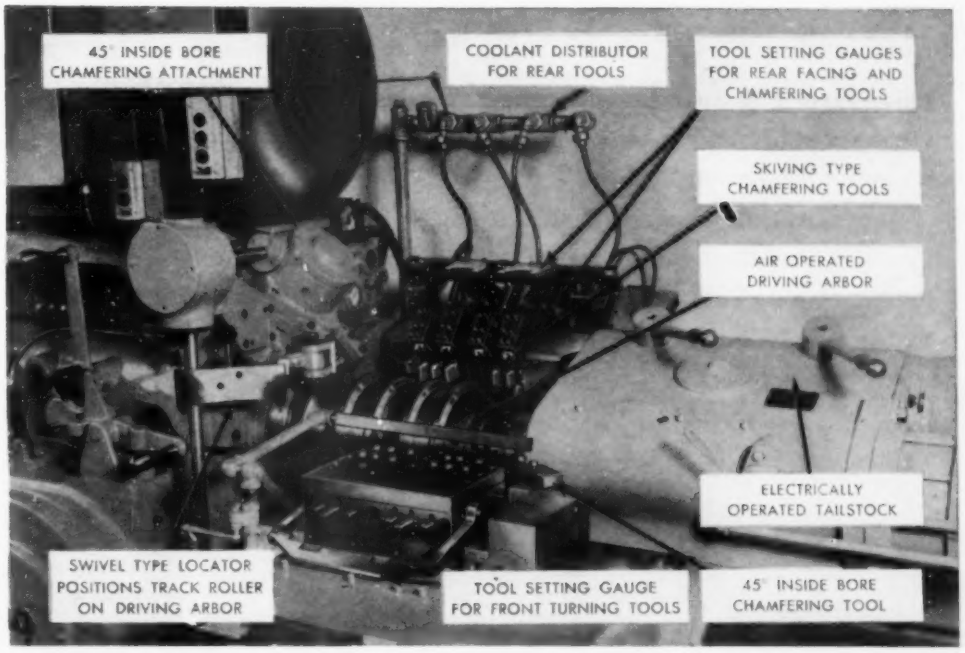


PRODUCTION COSTS

THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE *Lo-swing* PEOPLE" SENECA FALLS, NEW YORK

MODEL R-14 *Lo-swing* LATHE CUTS MACHINING TIME ON TRACK ROLLERS


45° INSIDE BORE CHAMFERING ATTACHMENT
COOLANT DISTRIBUTOR FOR REAR TOOLS
TOOL SETTING GAUGES FOR REAR FACING AND CHAMFERING TOOLS
SKIVING TYPE CHAMFERING TOOLS
AIR OPERATED DRIVING ARBOR
ELECTRICALLY OPERATED TAILSTOCK
SWIVEL TYPE LOCATOR POSITIONS TRACK ROLLER ON DRIVING ARBOR
TOOL SETTING GAUGE FOR FRONT TURNING TOOLS
45° INSIDE BORE CHAMFERING TOOL

Overall view of machine showing rough and finished work.

Close-up view of tooling.

Problem: To automatically turn, face and chamfer Track Rollers in one operation.

Solution: The Model R-14 Automatic Lo-swing Lathe was selected for this job due to its rigid construction and its demonstrated fine performance with cemented carbide tools. The Track Rollers, 9-3/4″ in diameter and 9-3/8″ long, are held and driven from the rough forged bore with a compensating type, six jaw air operated driver. The tailstock, shown in the withdrawn position in the large illustration, is electrically operated and has a travel of 16″ to facilitate loading and unloading of the rollers on the driver. The above illustration shows the tooling which consists of six front turning tools, eight heavy rear facing tools, eight small chamfering tools and two chamfering tools for the inside diameter. Note the special cam operated, 45° inside bore chamfering attachment mounted on the headstock of the lathe. Swivel type tool-setting gauges, mounted directly on the tool blocks, reduce tool-setting time. All tools are cemented tungsten carbide operating at cutting speed of 350 ft. per minute. Total floor to floor time for the job is 3.5 minutes each.

Engineered jobs are our specialty, and our staff is at your disposal to assist in solving your turning problems.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

ARE LOWER WITH *Lo-swing*

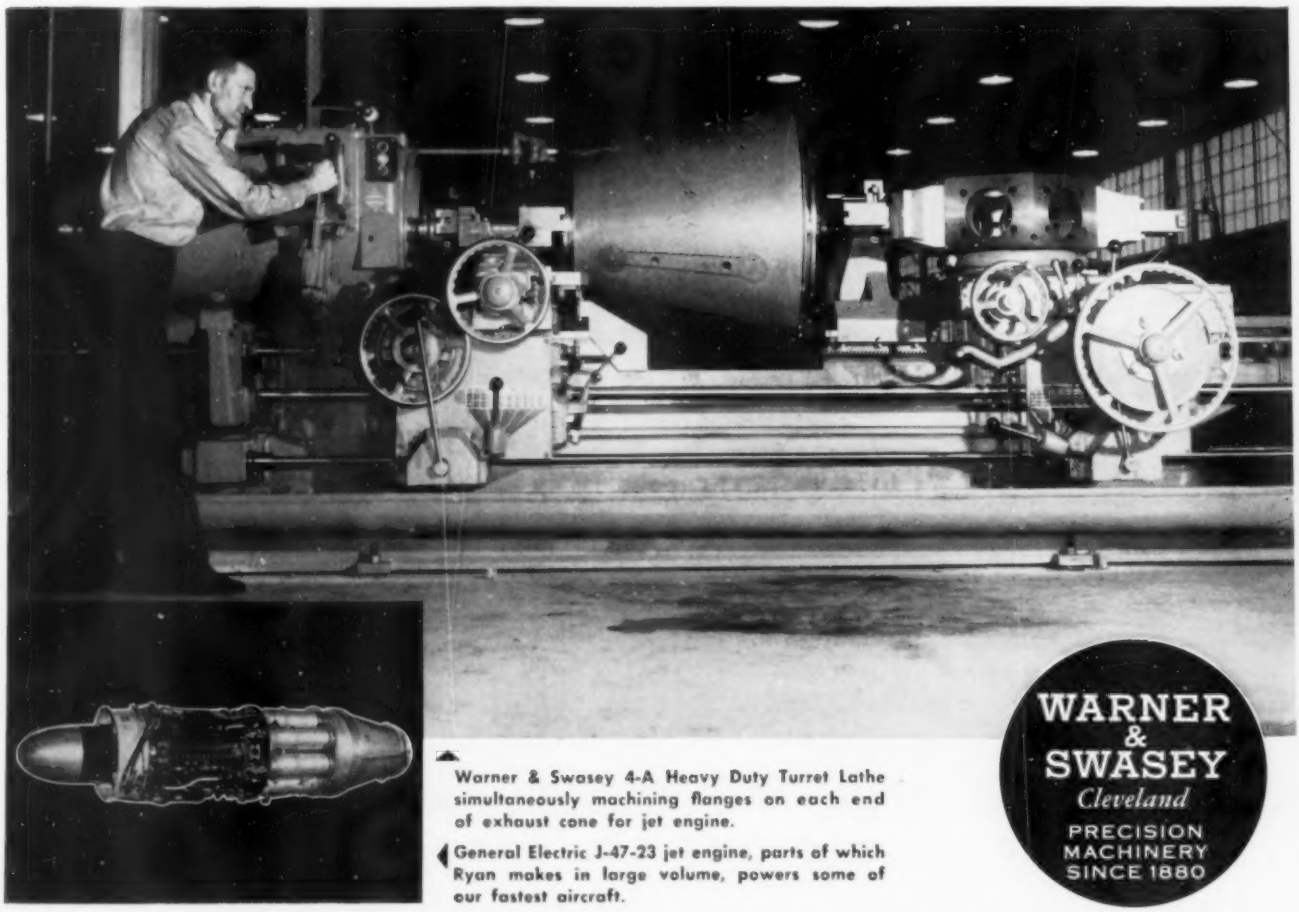
How machining time was cut in half on vital jet engine part

FROM RYAN AERONAUTICAL COMPANY comes this report. They recently installed the first of six modified Warner & Swasey 4-A Heavy Duty Turret Lathes to handle one important phase of production on jet engine components. In addition to slashing machining time in half, this new machine eliminated one complete setup, did away with storage problems, and drastically reduced handling.

This Warner & Swasey was especially designed with special tools and tool holders to machine the flanges on each end of the jet engine's big heavy-gauge, stainless steel exhaust cone. Prior to its installation, Ryan had to set up and machine the flanges on one end of each of a dozen cones, then store the cones around a machine until the new tooling setup was completed and the other ends of the cones machined.

Now, with the Warner & Swasey, the flanges on both ends are machined simultaneously. Cutting tools turn and form the flanges in one pass to 50 micro-inch smoothness. Only one setup is required for each cone, and as its flanges are machined, it is sent on down the production line. Scarce floor space is saved, and handling minimized.

Here is another example of how a Warner & Swasey Field Engineer, working with a company's production men, helped apply Warner & Swasey experience and "know how" to solve a tough production problem.



Warner & Swasey 4-A Heavy Duty Turret Lathe simultaneously machining flanges on each end of exhaust cone for jet engine.

General Electric J-47-23 jet engine, parts of which Ryan makes in large volume, powers some of our fastest aircraft.

WARNER & SWASEY
Cleveland
PRECISION MACHINERY SINCE 1880

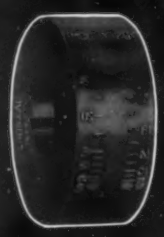
YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY MACHINE TOOLS, TEXTILE MACHINERY, CONSTRUCTION MACHINERY

MACHINE STAMPING AND EMBOSSING DIES

Higher production with CADILLAC Dies is assured by special steel selection, controlled heat treatment and precision engraving — noted for accuracy and high quality. We'll be glad to advise you on best marking methods.

PUNCH PRESS DIE

ROLL SEGMENT DIE



SOLID ROLL DIE

HEAVY BEVEL STEEL LETTERS AND FIGURES

The faces of CADILLAC Steel Letters and Figures combine a high degree of hardness with toughness, insuring exceptionally long life. Each stamp is clearly marked with character designation and size. Long tapering bevels assure easy alignment of characters. *(To the right, note CADILLAC's sturdily boxed Interchangeable Steel Type Set.)*

FORGING HAND STAMP

DIE INSERTS

EMBOSSING DIE

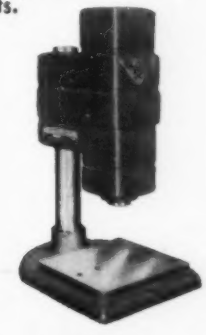
Why Not Sell YOUR Customers The Best?

There Are CADILLAC MARKING DEVICES Designed For ALL Marking Needs

Just as "variety" is called "the spice of life", varieties of marking methods and devices are essential for meeting modern production demands. CADILLAC STAMP COMPANY is equipped to offer or build every conceivable type of marking device, from simple hand stamps to especially created and designed machinery for unusual marking requirements.

CADILLAC 115 HAND MARKING MACHINE

For general purposes this floor type machine gives top service. Marking is done in a rolling operation—requiring minimum pressure. Marks flat or round parts of varying thickness. Foot pedal for marking flat or irregular contoured parts; table screw adjustable for round parts.



CADILLAC 52 AIR IMPACT PRESS

For high speed marking, assembling, branding, staking, crimping, riveting, also for producing light stampings. The 52 effects great savings in production — delivers speeds up to 10,000 strokes per hour—pressure up to 8 tons. Safe to operate, automatic controls. Can be hand, foot or electrically actuated.

Machines Above, Write for Bulletin M-120
Misc. Items, Write for Bulletin SE-130.

CADILLAC 45 HYDRAULIC MARKING MACHINE

Here's a compact, self-contained, manifold mounted, hydraulic unit. One control gives full range of marking depth. It will mark round, flat and irregular surfaces. Machine capacity is up to 110 one inch impressions per minute.

HAND STAMP NUMERALS

INTERCHANGEABLE TYPE AND TYPE HOLDER SET

HAND STAMP SYMBOLS

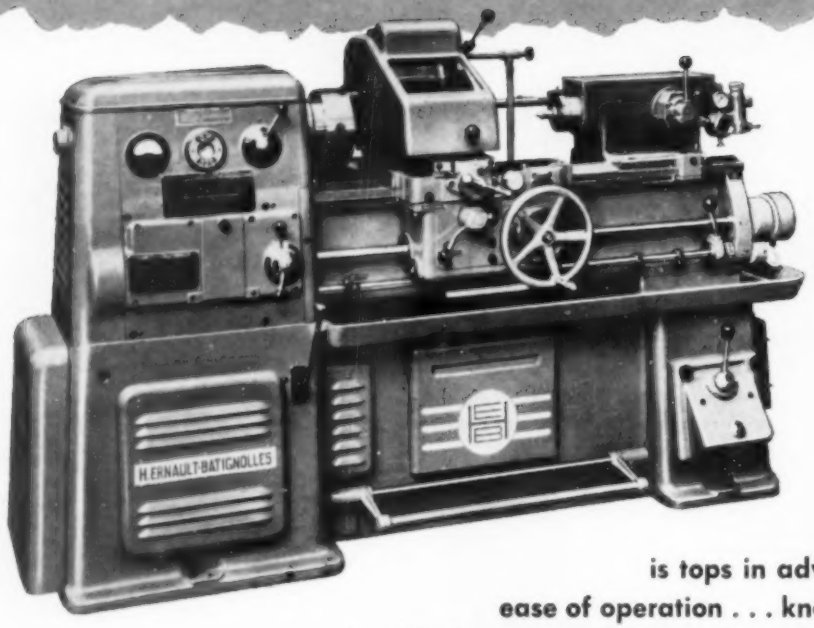
CADILLAC
Marking Devices

CADILLAC STAMP COMPANY

Factory and Offices

17313 Ryan Road • FO. 6-0500 • Detroit 12, Mich.

Production tested and approved in over 1,000 plants



HIGH SPEED HYDRAULIC COPYING LATHE

Those who have *compared* copying lathes know the H.E.B. is tops in advanced design, construction and ease of operation . . . know that the H.E.B. means faster, trouble-free production with better finish, no distortion of the work.

The H.E.B. Copying Lathe has higher spindle speeds—up to 3600 RPM in the **OP Models** to take full advantage of carbide. **GT Models** with rotating pattern are designed for copying an infinite variety of irregular, non-circular work.

You won't find *chips* any problem at all. A sloping bed together with a built-in coolant pump result in automatic wash-away of the chips into a rear pan, from which they are easily removed *without stopping the machine.* Featured too are the power operated back tool posts which are part of the standard machine.

Remember, the H.E.B.'s patented copying device is an integral part of this ruggedly constructed lathe, resulting in rigidity and accuracy. Setting time is reduced to a handful of minutes, and finished parts are copy-turned up to 300% faster than on multi-tool lathes.

Designed and built in France by H. Ernault Batignolles—machine tool manufacturers for almost a hundred years!

If you are planning to make an investment in a copying lathe you want the best . . . Study our insert in Sweet's Machine Tool Catalog—Or write or phone us for detailed catalog or a demonstration!

TYPE 178 CONSTAN CARBIDE TOOL GRINDER

•

Specially designed for carbide tools without attachments. Heavily built, the Constan combines smooth operation and ease of setting with great rigidity. The inclinable table incorporates a ball and socket vise so that the tool may be clamped in any position. Two diamond wheels are mounted on the wheel head, and each may easily be brought into position.

H·E·B
"THE WAY TO TURN"

IMMEDIATE DELIVERY

H. E. B. MACHINE TOOLS, INC.
475 FIFTH AVENUE • NEW YORK 17, N. Y.
Telephone: LExington 2-0266

COPYING LATHES • ENGINE LATHES WITH COPYING ATTACHMENTS • TOOL ROOM LATHES • CARBIDE TOOL GRINDER

PRESENTING, *Americans* Sensational '53

KING SIZE SELECTION OF DRILL BUSHINGS

VIRTUALLY ELIMINATES SPECIALS!

American's NEW CATALOG

Gives You This KING SIZE Selection!

Our new KING SIZE selection of standard types and sizes are immediately available to you through our fully stocked, exclusive Distributors – no waiting.

Our new CATALOG was produced for your convenience.

- **Contains the largest (King Size) selection of standard types and sizes available anywhere. 50% of your specials are now American's standards.**
- **All lengths are now standard. (No added charges)**
- **Simplifies selecting and ordering.**
- **Handy reference charts, pricing and technical data.**
- **Clearly organized and printed.**
- **Plastic coated—resists water, oil and grease smudges.**

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TRADE MARK

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5107 PACIFIC BLVD. LOS ANGELES 58, CALIFORNIA

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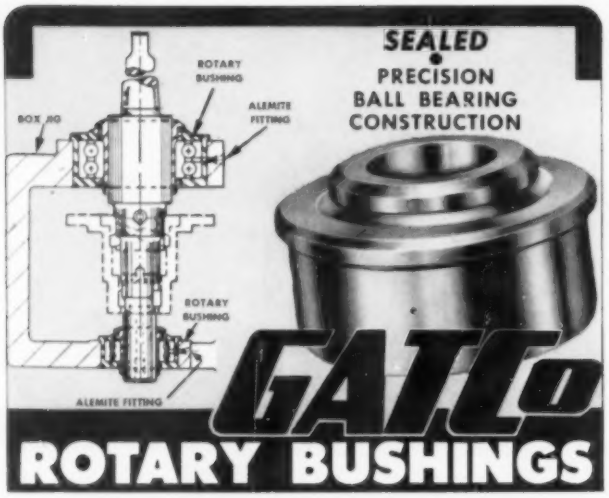
SPECIALIZING ONLY IN DRILL JIG BUSHINGS



SEALED
PRECISION
BALL BEARING
CONSTRUCTION

GATCO
ROTARY BUSHINGS

FOR DRILLING, CORE DRILLING,
ROUGH AND FINISHED BORING

The inner race of the GATCO bushing rotates with the tool, piloting the tool accurately below or above the work—or both.

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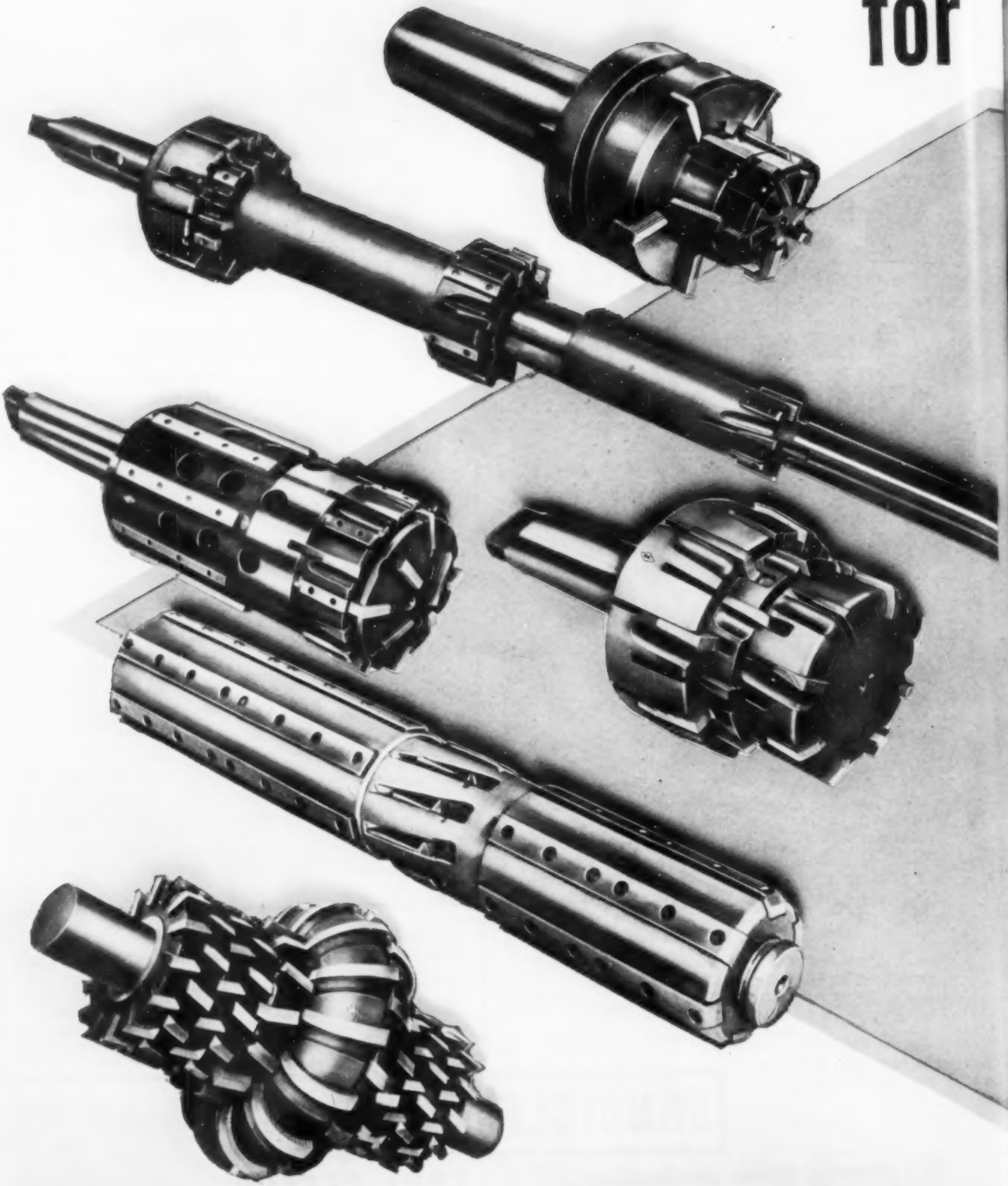
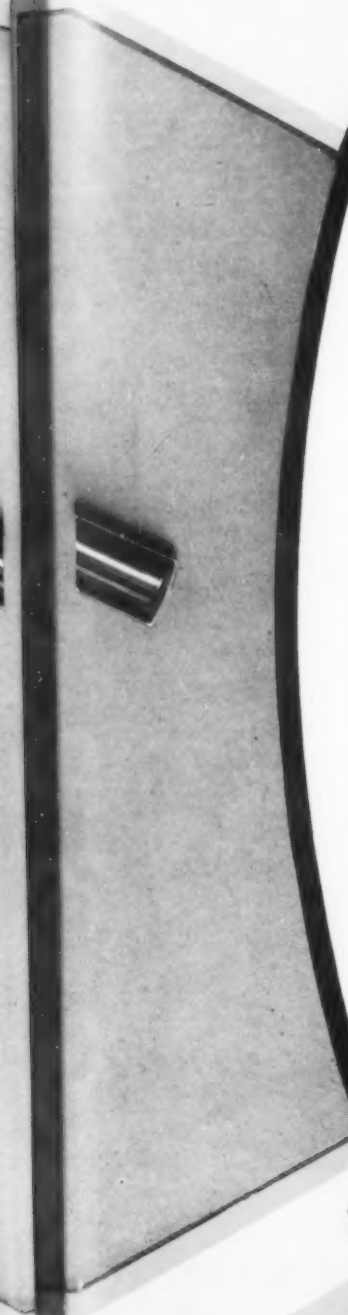


cutters
modern milling machines



multiple diameter milling with carbide

With properly designed carbide cutters you can make two, three and more cuts with one pass of the tool, remove four to twelve times as much metal compared to high speed steel cutters. To realize the full benefits of this high productivity, your milling machine must be in tip-top condition and take the accelerated speeds and feeds without vibration or backlash. The workpiece must be rigid and anchored close to the table.

On the left is a group of typical OK tools for multiple cutting with either high speed steel or carbide blades. OK cutters are sound in basic design. The simple, two-piece construction—body and blades—is the ultimate in strength, power and efficiency. Blades, once set, are immovable, and yet come out with a drift in a jiffy. They are easy to regrind and replace.

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On request we would be glad to send you the latest edition of Catalog 13 entitled "Modern Milling Cutters For Modern Milling Machines."

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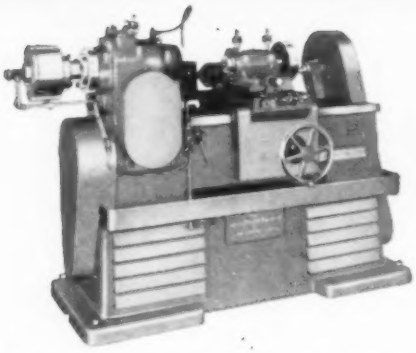

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- High speed drive to work spindle.
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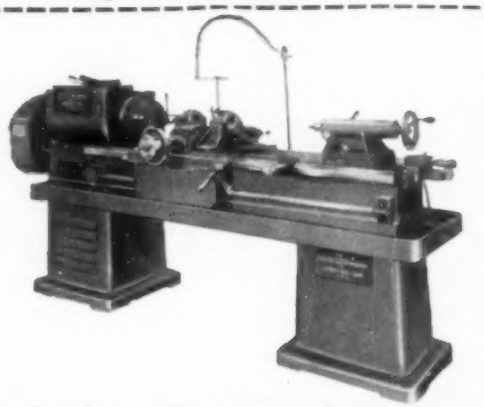

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- Operator always has control.
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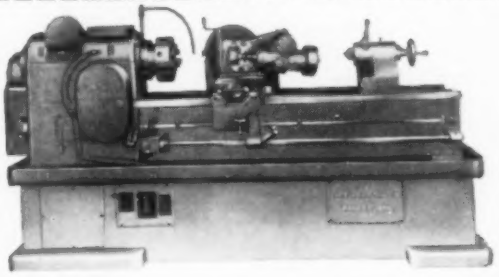

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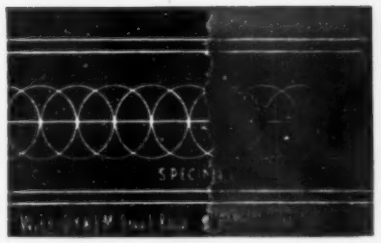

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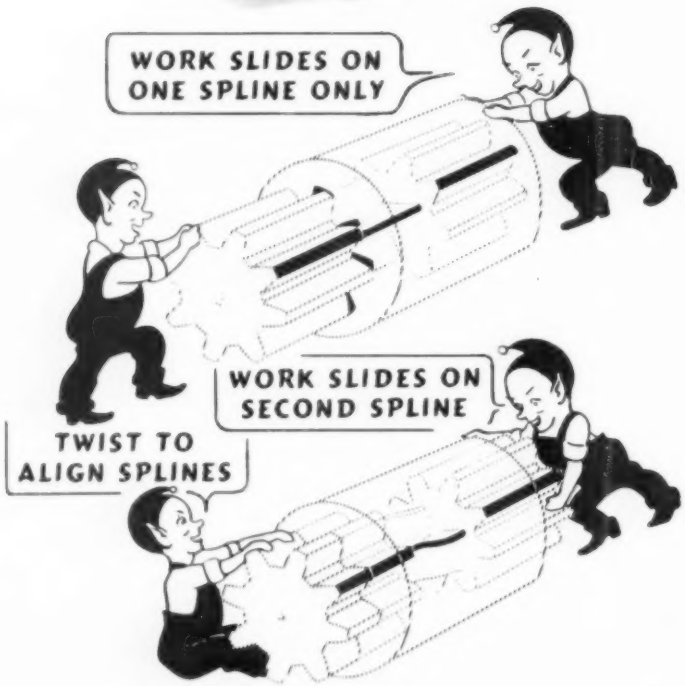
The Woodworth TWIST LOK *principle for splines*



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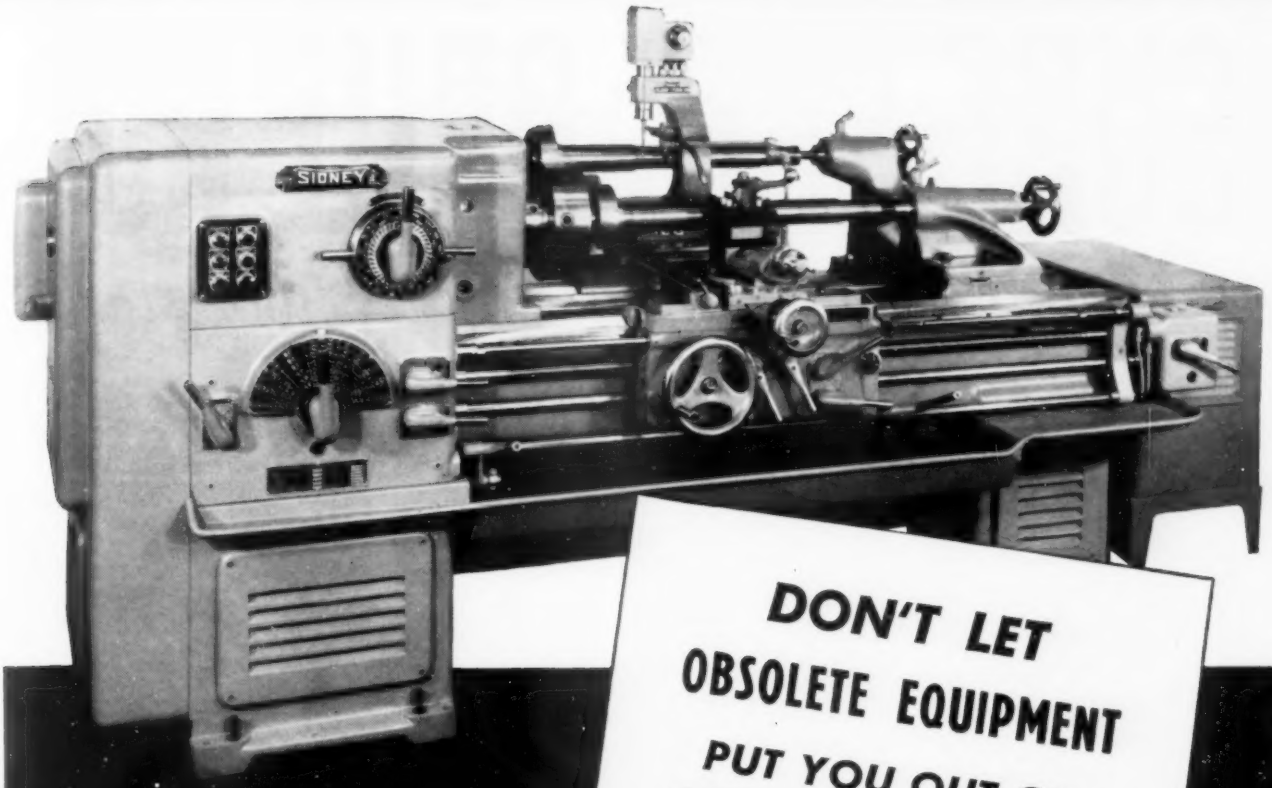

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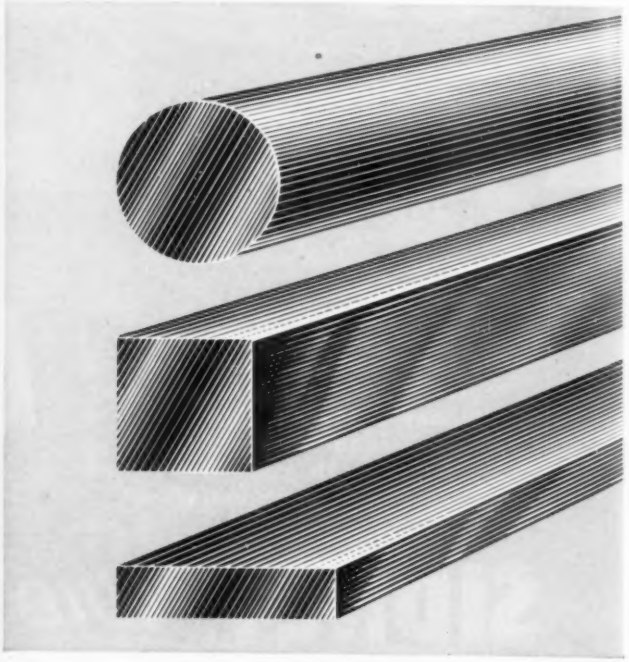

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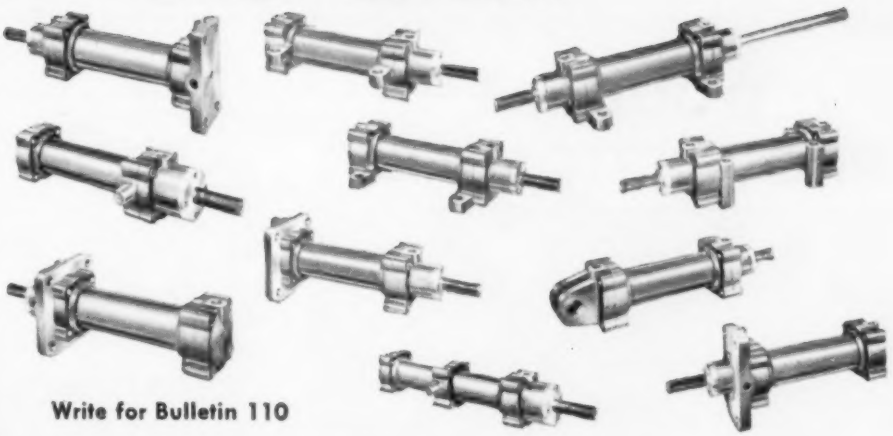

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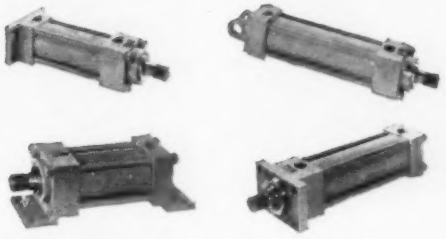

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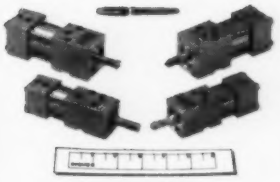

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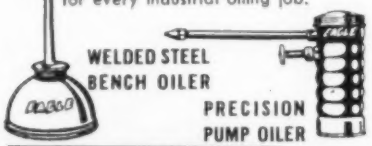

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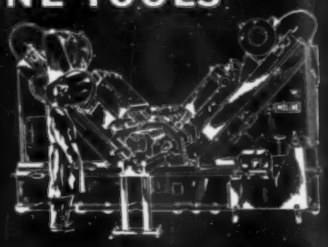

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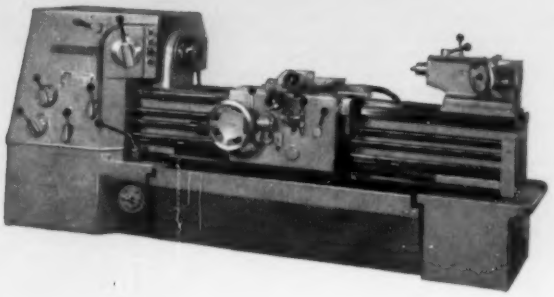

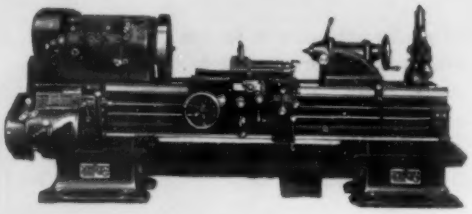

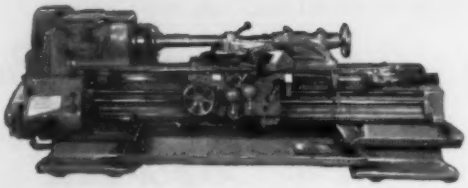

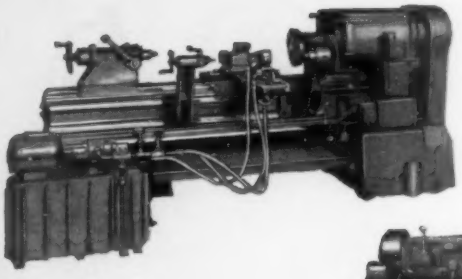

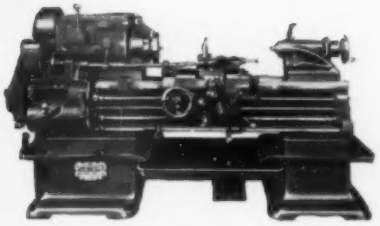

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14" to 32" sizes for heavy manufacturing operations or sensitive tool room work

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Saws and cutters, both carbide tipped and solid carbide, will aid production and precision in your slotting, venting, slitting and grooving operations . . . and they will be manufactured to your specifications. Please furnish complete specs and quantities desired when requesting prices and indicate material to be cut. MEYCO experience in the manufacture of precision tools, since 1888, is at your disposal.

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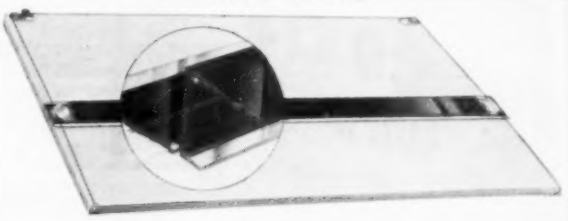

Mayline's Distinctive
Mobile Parallel Ruling Straightedge

MAYLINE

MAYLINE

Our finest straightedge, combining the feature of mobility with very rigid construction. This straightedge rolls over a drawing, minimizing smudging. Action is free and effortless. Blade is of phenolic laminate, edges are crystal clear butyrate.

Other straightedges in the line are: the Regal, the Ideal, and the E-Z Grip. All straightedges, with exception of the Regal, can be had as blade only or with parallel ruling attachments.

All models obtainable in lengths of 30" thru 96". See your local dealer, or write direct to factory.

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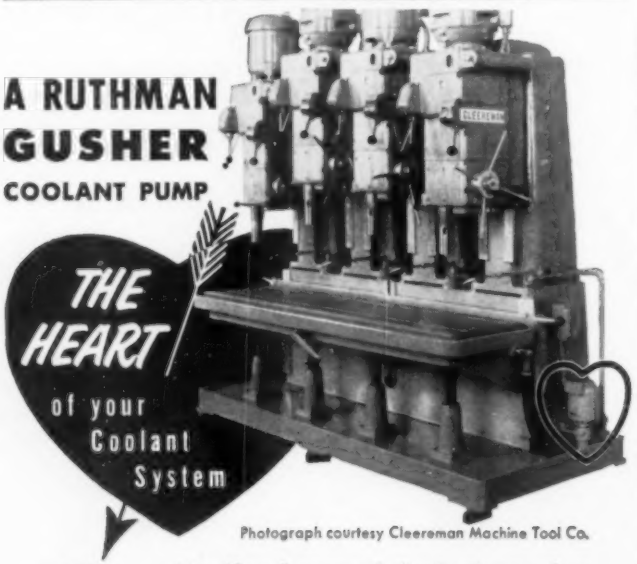
A RUTHMAN GUSHER COOLANT PUMP



Photograph courtesy Cleereman Machine Tool Co.

You'll go far toward eliminating coolant troubles on your machines when you *specify* Gusher Coolant Pumps. Gushers are precision built! All rotating parts are electronically balanced. Maintenance costs are cut to a minimum. Illustrated is a Model 325 Cleereman Four Spindle Drilling Machine with a Model UL-2106 Ruthman Gusher Coolant Pump.

THE RUTHMAN MACHINERY CO.

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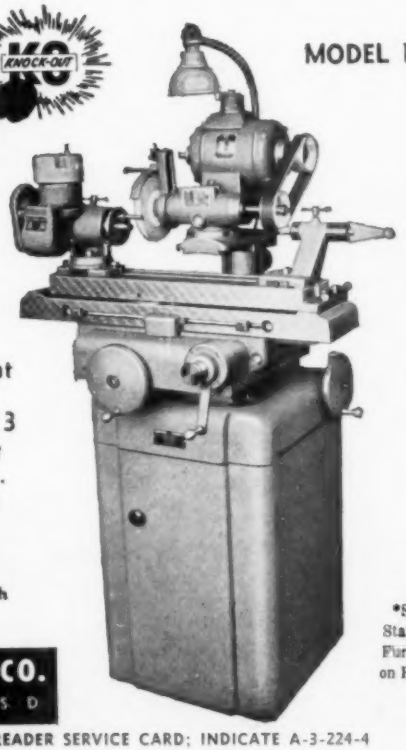
MODEL B860



Will do anything that machines costing 2 or 3 times more will do . . . yes and in less time.

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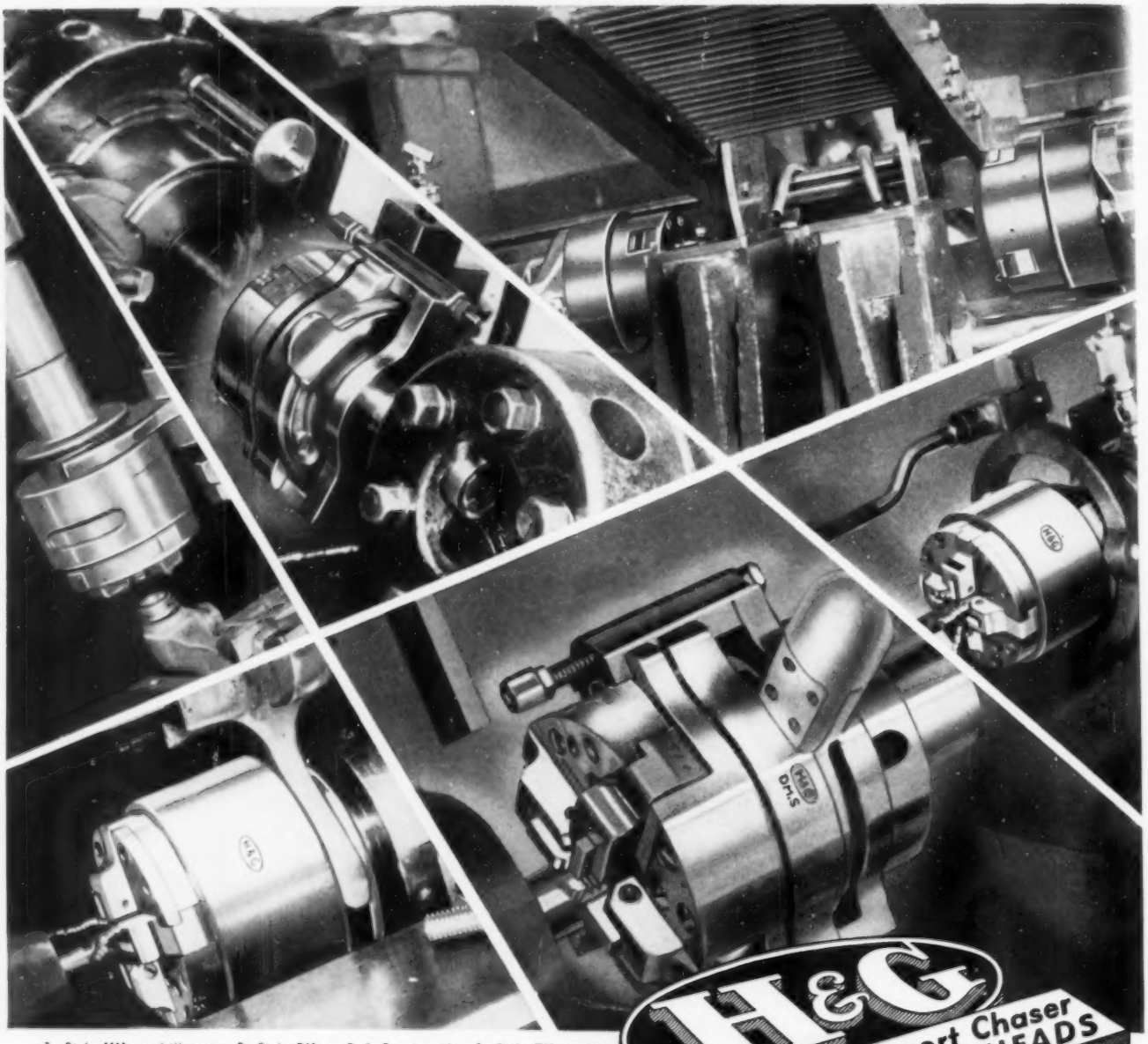


1. Style MM on drill press. 2. Style DM on B & S automatic. 3. Style TM cutting taper threads on double-end threader. 4 Style MM on multi-spindle automatic. 5. Style DMS on turret lathe. 6. Style MM on threading machine.

WHY IS IT? In automatic screw machine departments . . . 4 out of 5 of the die heads on-the-job seem to be H & G

You'll find other makes on the premises —tucked out of the way on the floor, on a nearby bench, on the foreman's desk, on the second shelf of the tool crib—

But, *on the job, cutting threads*, it is H & G.

Why this preference? What accounts for it?

It could be that producers of threaded parts find H & G more economical for threading by virtue of the low cost of insert chasers.

It could be that set-up men and operators have less trouble, less rejects, less downtime . . . with H & G Die Heads.

It could be the better class of threads . . . clean-cut, straight, true and accurate to micrometer dimensions, produced by H & G Die Heads.

It could be the interchangeability of H & G insert chasers, permitting jobs to be shifted from machine to machine, reducing the money tied up in inventory and the space required.

It could be the sum total of all these advantages that make the H & G Die Head—most wanted by operators, working for efficiency; most wanted by management, working for profits.

If you are not enjoying these benefits, may be you can do something about it. Write for Bulletin: How to Select the Proper Die Head for the Job, and mention make of machines operated.

THE EASTERN MACHINE SCREW CORPORATION • 27-47 Barclay Street, New Haven, Conn.

You can save lots of time

with these BEHR-MANNING® Abrasive Tools

There are dozens of operations in most shops where these handy abrasive tools profitably replace clumsy and time-consuming methods. You can, of course, wrap a piece of abrasive cloth on a round object and polish a hole with it, but why not use a METALITE Cloth Pencil on a mandrel in a portable tool? It's a lot faster. Same for deburring or radiusing the edge of a hole—a METALITE Cloth Slotted Disc is a slick trick for that job.

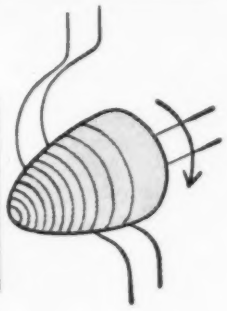
All of these tools have been devised to cut out profit-leaks on operations that are common in many shops—perhaps in your own. Get in touch with your BEHR-MANNING Field Engineer who will be glad to help you.

The packet "Blueprints for Production" gives various case histories that show new ways in which BEHR-MANNING coated abrasives are cutting production costs. For your copy, write Behr-Manning Corp., Troy, N. Y., Dept. TE-3.

® * Trade-marks

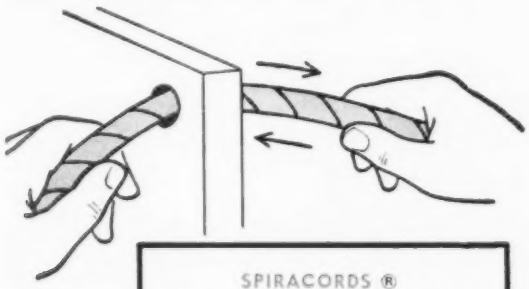
METALITE CLOTH PENCILS

Used on a mandrel for polishing channels, fillets, rounded corners, and the sidewalls and bottom of "dead-end" holes.



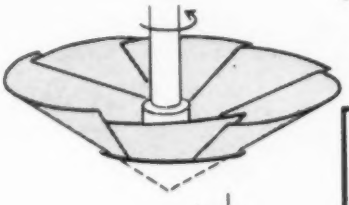
METALITE ® CLOTH SPIRAPOINTS ®

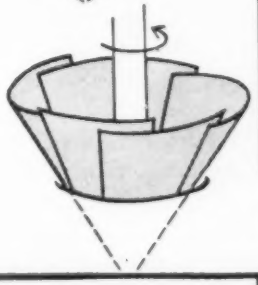
Mounted on threaded mandrels, they produce high finishes in odd-shaped recesses or on various radii.



SPIRACORDS ®

Narrow strips of METALITE Cloth wound spirally. Can be used on mandrel, or may be threaded like cord through holes for polishing and deburring edges.



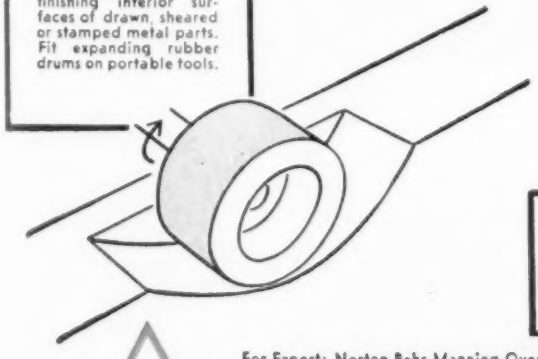


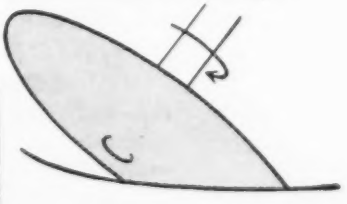
METALITE CLOTH SLOTTED DISCS

When pushed into a hole, the slots enable the sections to overlap, polishing the hole surface. Fine for radiusing and deburring drilled openings.

SPIRABANDS ®

For deburring edges and finishing interior surfaces of drawn, sheared or stamped metal parts. Fit expanding rubber drums on portable tools.





MUSHROOM* SANDING PADS AND DISCS

Shape and polish low areas as drawing-die work, deburr and polish edges, finish concave or flat surfaces.

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Specify *American* Broaches

For the best results use American broaches —whether you broach keyways or drive gears.

BROACHING MOTOR COUPLINGS WITH AN AMERICAN STANDARD KEYWAY BROACH

A simple operation yet requiring accuracy is the production broaching of keyways in motor couplings.

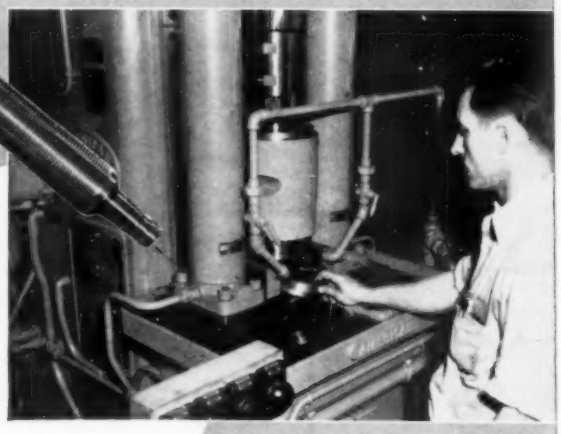
In this tooling set up the operator is not required to remove the American keyway broach from the pull head as he threads the part over the broach onto a work horn. High production is obtained as a part is loaded on each return stroke.

Whether your problem is keyways or complicated involute splines, American broach engineers can design the proper broach to produce parts to your requirements.

FINISH BROACHING AUTOMATIC TRANSMISSION DRIVE GEARS

The prime requirement of automatic gears is silence in operation and long life. American broaches are used to finish the drive gear's helical involute teeth on the American machine shown to the right. No further internal machining is necessary on these gears which must pass rigid tests before final assembly.

Let American quote on your broaching requirements — machines, broaches and fixtures. Send a part print and full information.



COMPLETE BROACHING INFORMATION

Over 5,000 copies of Catalog 450 have been distributed . . . get your copy now of this informative data book on American Broaches. Photographs . . . drawings . . . charts and case histories of broaching tools. Write today for your copy!

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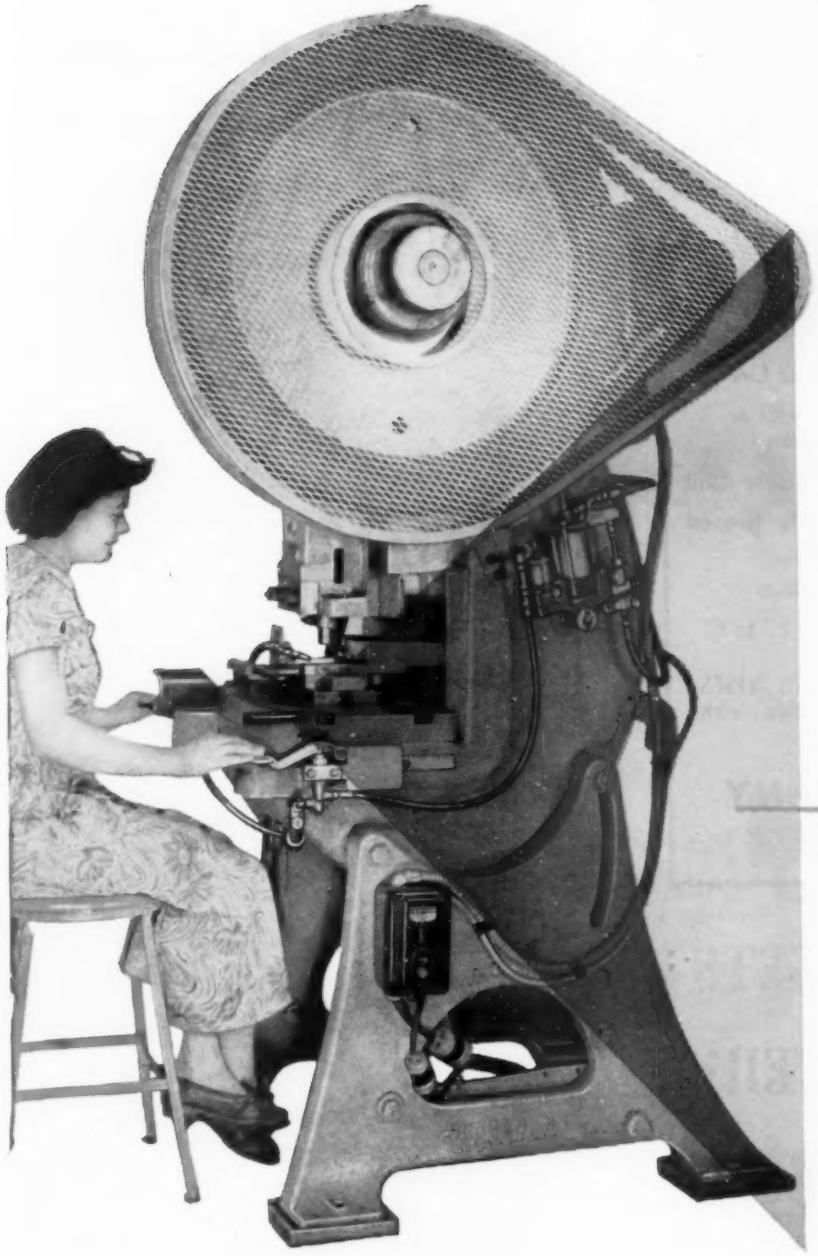

Operator confidence soars—and so does production—with the Schrader Press Control. For this control is definitely a two-hand device. It is designed so that the hands that feed the die must also operate the press. Both hands must be used simultaneously for each operation of the press and cannot stray into the danger zone when the ram comes down.

This *increased safety* of Schrader's Press Control lets operators build a worry-free rhythm that puts new speed in your presses in just a short time.

What's more, Schrader Controls end the fatigue common with mechanical foot pedal operation—a Schrader-

Reduce Danger Here

equipped press can be run as easily as an ordinary typewriter.

Wherever you have a power press—or any machine with a mechanical clutch—there's a chance to increase safety . . . boost operator confidence and thus increase production with a Schrader Control.

Let us help you decide what will best fit your needs. Write, describing the machines you plan to equip—or fill out the coupon below.

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Air Cylinders • Operating Valves • Press & Shear Controls • Air Ejection Sets • Blow Guns • Air Line Couplers • Air Hose & Fittings • Hose Reels • Pressure Regulators & Oilers • Air Strainers • Hydraulic Gauges • Uniflare Tube Fittings

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ACME BENCH VISES have ALL these features

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No Side Twist or Wobbling

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Important addition

To SUMMIT-ROBERTS TOOL CO.

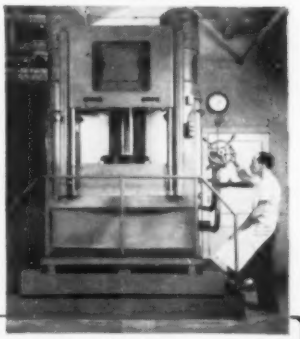
... a 2500 ton hobbing press

For over 20 years we have hobbed cavities in only the highest quality hobbing steel. Now, by industry demand we offer our services to cold hobb your cavities for

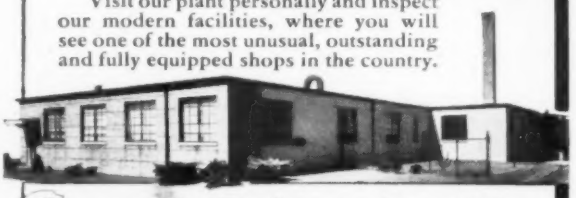
MOLDS for Plastics

Die casting Dies

We can make the hobbs or use yours.



Visit our plant personally and inspect our modern facilities, where you will see one of the most unusual, outstanding and fully equipped shops in the country.



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830 NEW YORK AVE. • TOLEDO, OHIO

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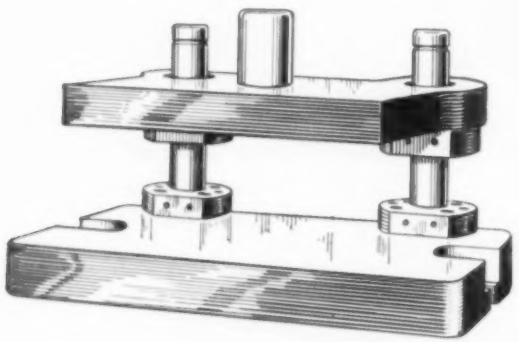
BAUMBACH DIE SETS GET THERE FASTER!



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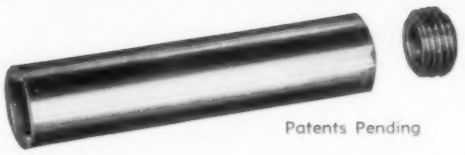
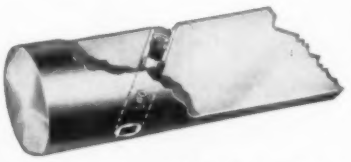
How SQUARE HOLED SLEEVES SPEED UP TOOL-MAKING!



Patents Pending

One of the most difficult problems in tool making can be solved easily and quickly with Sturdy Square Holed Sleeves. The perfection of broached square holes can be had in boring bars, milling cutters and many other applications at a small fraction of the cost of imperfect hand-made square holes. The Sturdy Square Holed Sleeve consists of a round sleeve with a perfectly square hole broached through the center. This hole is tapped at one end to receive a back-up screw which is furnished with the Sleeve. The Sleeve can be sweated or pressed into a drilled and reamed hole to make a perfectly square accurate hole in a very few minutes.



The Sturdy Square Holed Sleeve will save you many hours and many dollars in the making of boring bars, tool holders and other tools requiring square holes.

SLEEVES MADE IN FOLLOWING SIZES:
3/16, ¼, 5/16, ⅜, 7/16, ½, ⅝, ¾, 1"

•

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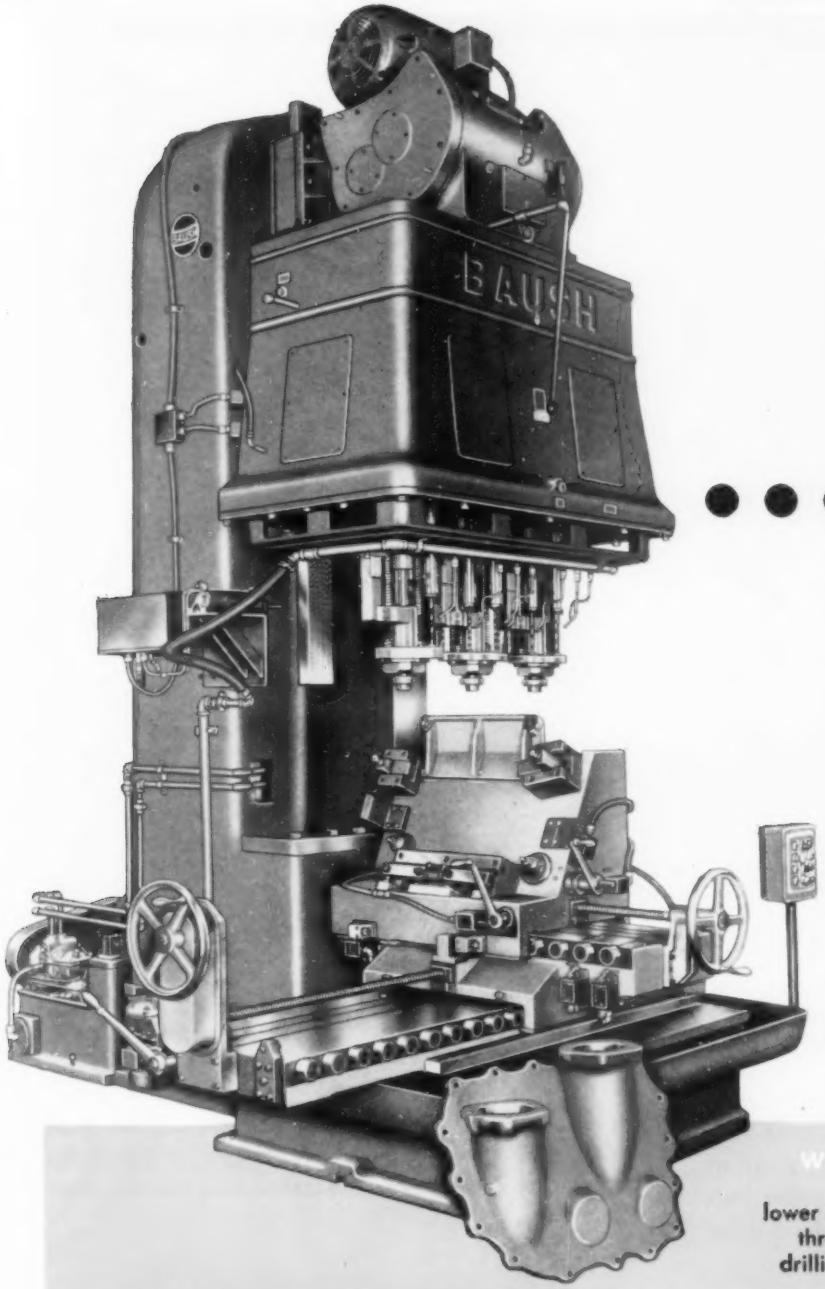


CUT COSTS ....SPEED UP WORK

with BAUSH Multi-Spindle Machine Tools . . .

. . . just as one large defense plant is now doing with this Baush Vertical 'W-7 Type' Hydraulic Multiple Spindle Drilling Machine

This unit is furnished with 20" x 45" rectangular head, of the joint driven type, on which is mounted a master bored cluster plate having (14) 2" diameter slip sleeve type spindles.

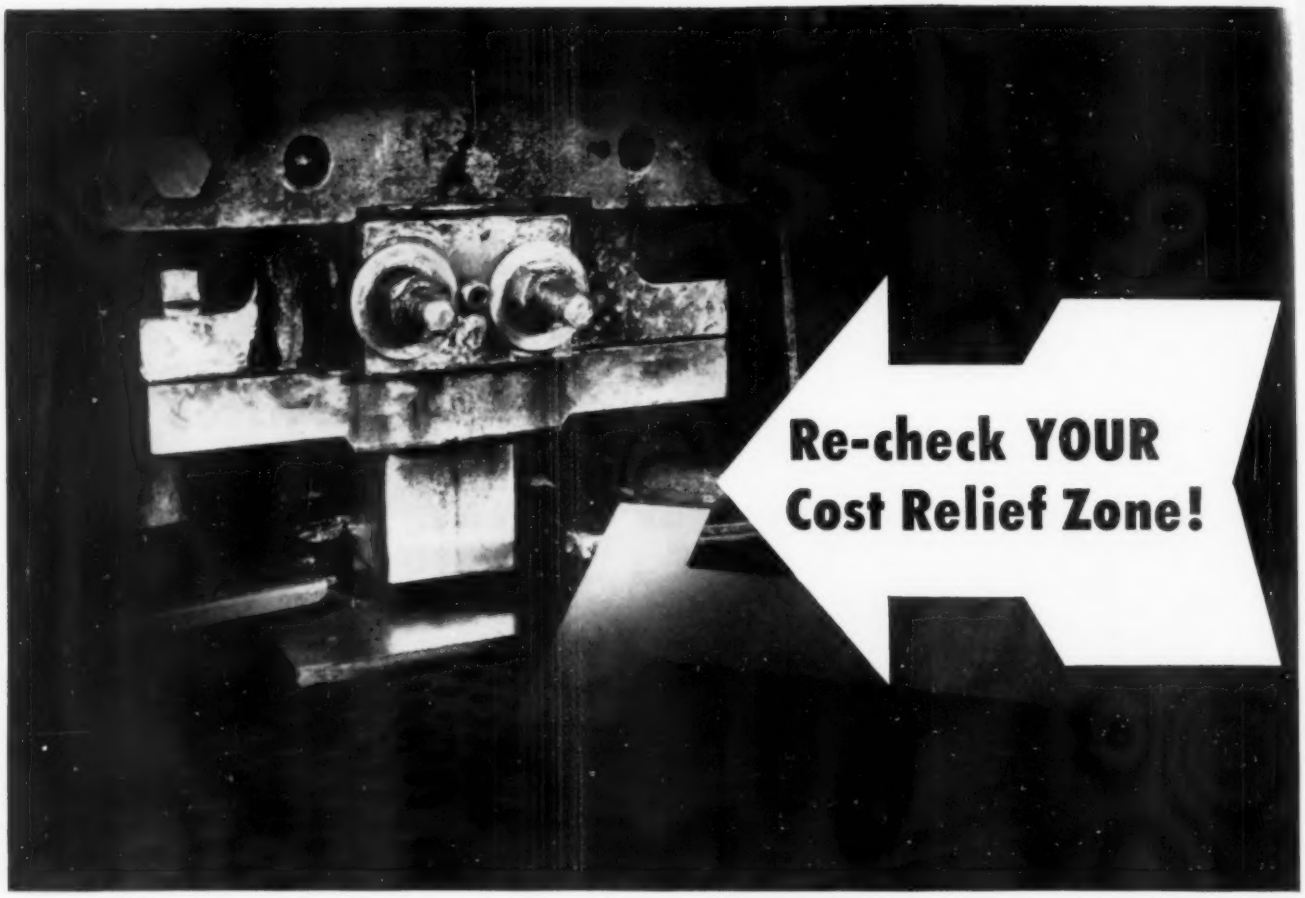
What it does: This unit is arranged to drill and countersink holes in both upper and lower bosses of heavy CAST STEEL housings. It has three (3) groups of spindles to perform fourteen drilling and countersinking operations in three (3) successive work positions:

Position #1 — Drill two (2) holes ¾" dia.
Position #2 — Drill six (6) holes for ½ x 13 tap
Position #3 — Countersink six (6) holes for ½ x 13 tap

Both machine and fixture are designed to handle either R.H. or L.H. housings.

How it does it: Parts load into fixture out from under head to the left of machine. Parts set against an angle plate type fixture, locating from two (2) moveable pins which enter the reamed construction holes and are clamped to plate with planer type clamps. Fixture proper is mounted on a double slide, (left to right and front to rear), which is positioned by hand operated electrically interlocked shot bolt. Slide operates by screw and hand wheel. Individual bushing plates are furnished at each work position with guide bushings for all the tools. These plates rest on the fixture and pick-up in the part for location.

BAUSH MACHINE TOOL CO.
SPRINGFIELD 7, MASSACHUSETTS



If You are Responsible for Tooling and Production, Accept this Challenge and Get Results!

If other men with responsibilities like yours can find a new source for cost economies in their tools and dies, why can't you? By taking a fresh look at this vital cost zone, one plant now makes far fewer dies each year to do the same jobs. Another has been able to lengthen die life between grinds so that costly machine•downtime is no longer a problem. Still another reports that expensive die finishing and adjusting are being held to a minimum.

Another good example is the job shown above. These tools notch different shapes in materials ranging from ⅛" thick c.r. steel to ¼" diamond plate. A re-check of the dies showed that a steel with more toughness was needed, and Carpenter R.D.S. (Oil-Tough) was put to work. Now, where the "old" tools chipped badly and required frequent regrinding of as much as .031" off the surface, the R.D.S. tools hold up day after day with only occasional sharpening. And when sharpening is required, the toolroom has to remove only .010"/.015".

To re-check *your* cost relief zone, use The Carpenter Matched Set Method to select the one steel best suited to cut costs. This method is backed by strictly dependable tool and die steels that *stay* on the job. For rush delivery, call your nearest Carpenter Mill-Branch Warehouse or Distributor. THE CARPENTER STEEL COMPANY, 154 W. BERN ST., READING, PA.

Are You Missing These Opportunities In *Your* Cost Relief Zone?

- Less die finishing and adjusting
- Greater output between grinds
- Fewer heat treating failures
- Less machine downtime

On Job After Job Carpenter Matched Tool and Die Steels Have Made Them Possible!

Carpenter STEEL

Matched Tool and Die Steels

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Mill-Branch Warehouses and Distributors in Principal Cities Throughout the U. S. A. and Canada

Packard engineers saved $1.74 per part when this ultramatic transmission shaft was redesigned from a forging to a steel shaft and casting. They saved $74,325 in equipment and tooling, too.
Auto parts manufacturer saves $2000 monthly brazing shanks on hi-speed lathe tool stubs. Formerly these $17.00 tools had to be discarded when worn down to 4". Now they use up 100% of the tool.
Here's how you can save time and money with
TOCCO* Induction Brazing
American Emblem Co. reduced solder cost 50%; cut repairs and rework due to misalignment of parts 98% and doubled output when they switched from hand soldering to automatic TOCCO soldering.
Commercial Shearing and Stamping Co. changed from welding to TOCCO brazing these hydraulic cylinder assemblies and doubled production while cutting unit costs 50%.
Nash Motors changed from a hand torch to TOCCO Induction brazing of drain flanges to oil pans. Labor and material costs dropped from $12.75 to $4.90 per hundred—a cut of 60%. Hourly production more than tripled.
Norris-Thermador Corporation switched from arc welding to TOCCO Induction Brazing of this bushing and clamp assembly. Result: costs reduced from $46.44 to $31.73 per 1000 parts—a 32% saving.

If your product involves brazing, heat-treating, forging or melting of ferrous or non-ferrous metals, similar savings of time and money can probably be uncovered in your plant, too. A TOCCO engineer is glad to survey your plant without obligation, of course.

THE OHIO CRANKSHAFT COMPANY

TOCCO

*Trade Mark Reg. U. S. Pat. Off.

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Dept. G-3, Cleveland 1, Ohio

Please send free copy of "Typical Results of TOCCO Induction Brazing and Soldering."

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Job-Proved, Cost-Cutting, Production Helps

Methods and Production Case Records on a wide range of actual operations

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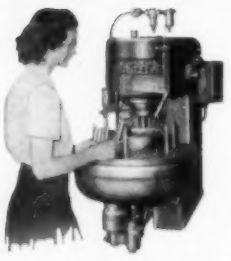

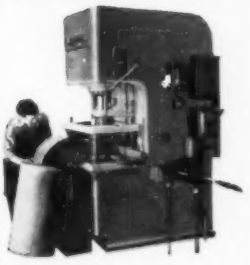

See how *others* cut costs with

MULTIPRESS®

Facts and figures from hundreds of actual users tell *how* and *why* the smooth oil-hydraulic power and control of Multipress cuts production costs. Our Data Log reports on these applications may offer better answers to some of your own production needs.

Multipress offers complete adjustability of ram speed, pressure and stroke length.

Pressures build up instantly as the ram contacts the work . . . there's no hammer-blow impact on work or tooling.

With Multipress Index Table Feeds, work can be loaded on multiple fixtures that index to the press ram automatically at speeds up to 70 per minute — often keeping two or more operators busy at top speed.

Automatic time delay, for ram dwell or hold-down, is easily provided with Multipress.

Many other types of valving, ram controls, auxiliary feeds, operating accessories and tooling attachments can be interlocked with the Multipress ram action. **Let us** send you full details on Multipress.

Write Today for Data Logs on types of operations your production requires.

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with interchangeable pilots

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Introducing the Butterfield High Speed Counterbore and Spot Facer in standard and aircraft designs . . . latest example of Butterfield craftsmanship. *Ask your distributor.*

BUTTERFIELD

Union Twist Drill Company ***Butterfield Division*** *Derby Line, Vermont, U. S. A.*

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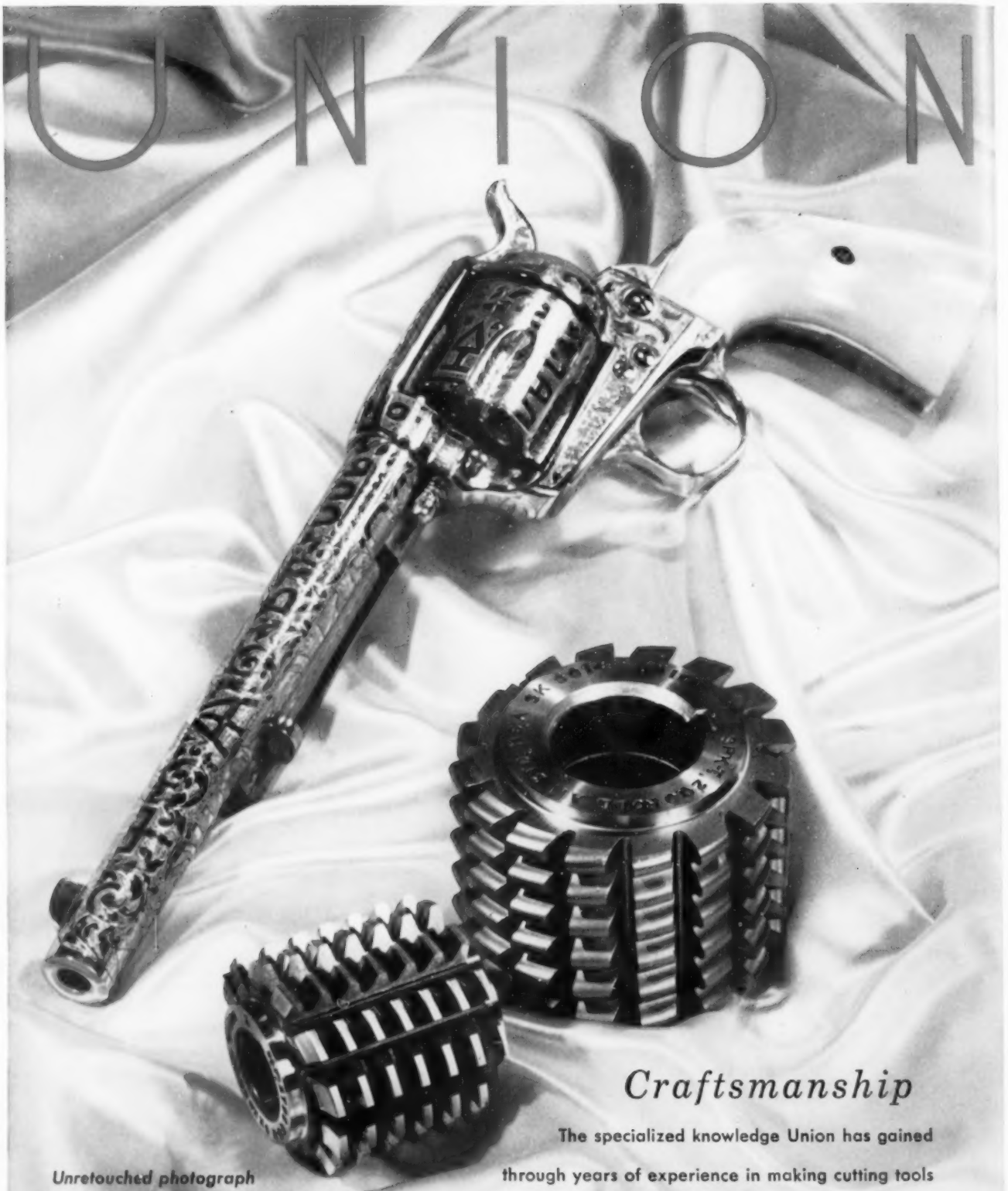


Craftsmanship

The specialized knowledge Union has gained through years of experience in making cutting tools is applied to every individual design it turns out.

Unretouched photograph by Morton Berger

UNION TWIST DRILL COMPANY • ATHOL, MASSACHUSETTS

Milling Cutters Gear Cutters Twist Drills Hobs Reamers Carbide Tools

OWNERS AND OPERATORS OF: S. W. CARD MANUFACTURING CO. DIVISION, Mansfield, Mass.
BUTTERFIELD DIVISION, Derby Line, Vermont and Rock Island, Quebec

220 Delpark FILTERS

SPEED PRODUCTION

AT

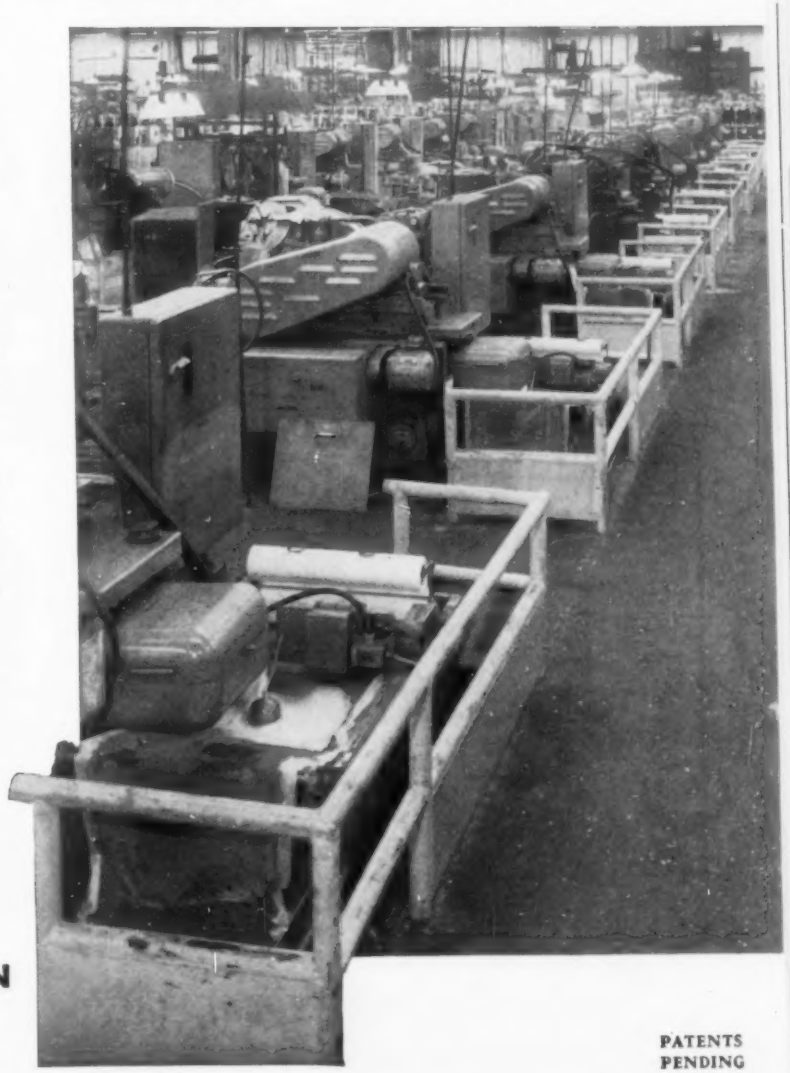
Continental Motors Corporation

MUSKEGON, MICHIGAN

The value of clean coolants for grinding operations is certainly recognized by the Continental Motors Corporation in Muskegon, Michigan. Here, in the grinding department, 220 Delpark Filters remove swarf and wheel particles from the coolants supplied to Norton grinders.

Through the use of full flow, self cleaning Delpark Filters, clean coolant is supplied to the cutting wheel assuring a greater accuracy, less wheel dressing, greater machine efficiency, and lengthened coolant life.

If you have machine tools which require the use of soluble oils or cutting oils in machine operations, there's a place for Delpark Filtration to save you money, increase production, and improve machine efficiency.



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Delpark

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Backed by More Than 30 Years Experience in Industrial Filtration

PATENTS PENDING

INDUSTRIAL FILTRATION COMPANY BOX F-153 **LEBANON, INDIANA**

You Can CUT COSTS in Cutting

SHEET
PLATE
STRUCTURALS
ROD - BAR
TUBING
EXTRUSIONS

with

STONE HIGH-SPEED CUTTING MACHINERY

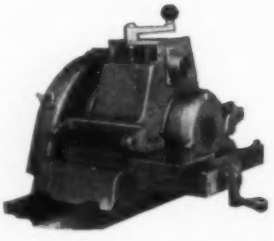
LOOK AT THESE TYPICAL CUTTING TIMES

Cold Rolled	1" Dia. Rod	4 Seconds
Cold Rolled	1¼"x2" Bar	8 Seconds
Stainless Steel	2¼" OD Tube	27 Seconds
Aluminum	2½" Dia. Rod	12 Seconds
Brass	1"x1" Bar	4 Seconds

Models Available for ALL SHOP NEEDS!

MODEL M-75

A floor model, 2½' x 4' equipped with full 7½ h.p. geared-in-head motor engineered with positive drive, will cut all ferrous and non-ferrous solids up to 2½" — pipe and structurals up to 4". Can be equipped for wet cutting.



MODEL SS-20

Operates on guided rails for cutting larger structural steel, plate, sheet, with cuts up to nine feet in length. Cuts wet or dry.

MODEL M-14

32" x 34" Bench Model. This mighty little brute, with full 3½ h.p. geared-in-head motor engineered with positive drive, will cut all ferrous and non-ferrous solids up to 2" — pipe and structurals up to 2½". Two models — straight cut-off and swivel head for angle cutting to 45°. Legs available.

For complete information write to

STONE MACHINERY CO., INC.

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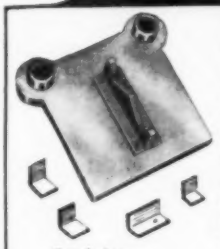
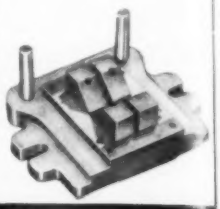
Punches and Dies



Send for free illustrated catalog No. 152 B.

Angle Iron Cut-Off Die

Mounted in leader pin die set. Fits most all makes of 25-ton and larger presses. Simple shearing action insures straight, clean cut WITHOUT DISTORTION. Just one of our many standard stock-dies.



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Manufactured in all tapers. 1 to 6 MT in stock. Special shanks and points made to order.

Points Illustrated are standard.

Ask your Supplier or Write for Literature.

ROYAL PRODUCTS

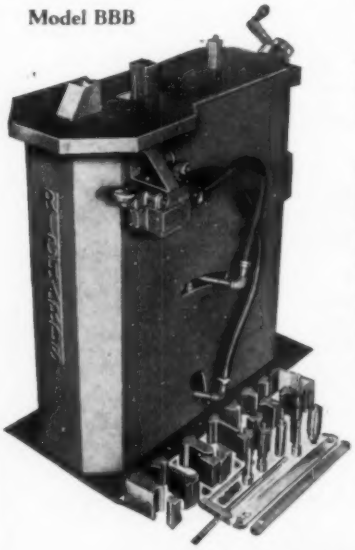
90 UNION ST. MINEOLA, N. Y.

USE READER SERVICE CARD; INDICATE A-3-238-3

MULTIFORM BIG BROTHER BENDER

Produces Without Special Tooling—Saves Die Costs Saves on Expensive Presses

Model BBB



Illustrated above are a few of the many forms that can be produced efficiently on the Multiform Bender, using the standard tooling.

The heavy duty Big Brother Bender is designed for fabricating bus bars, brackets, fixtures, etc., without special tooling. Air controlled with finger tip response. Comes complete with dies, mandrels and wrenches—punching and blanking dies extra. Will punch holes up to 1" and form material up to ¼" thick by 4" wide. We also build smaller hand or air operated models for forming up to ⅛"x1½" material.

Send for illustrated folder TE-5

J. A. RICHARDS CO. 903 North Pitcher St. Kalamazoo, Michigan

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INDUSTRIAL FILTRATION COMPANY BOX E-153 LEBANON, INDIANA

Warplis

PRECISION GROUND

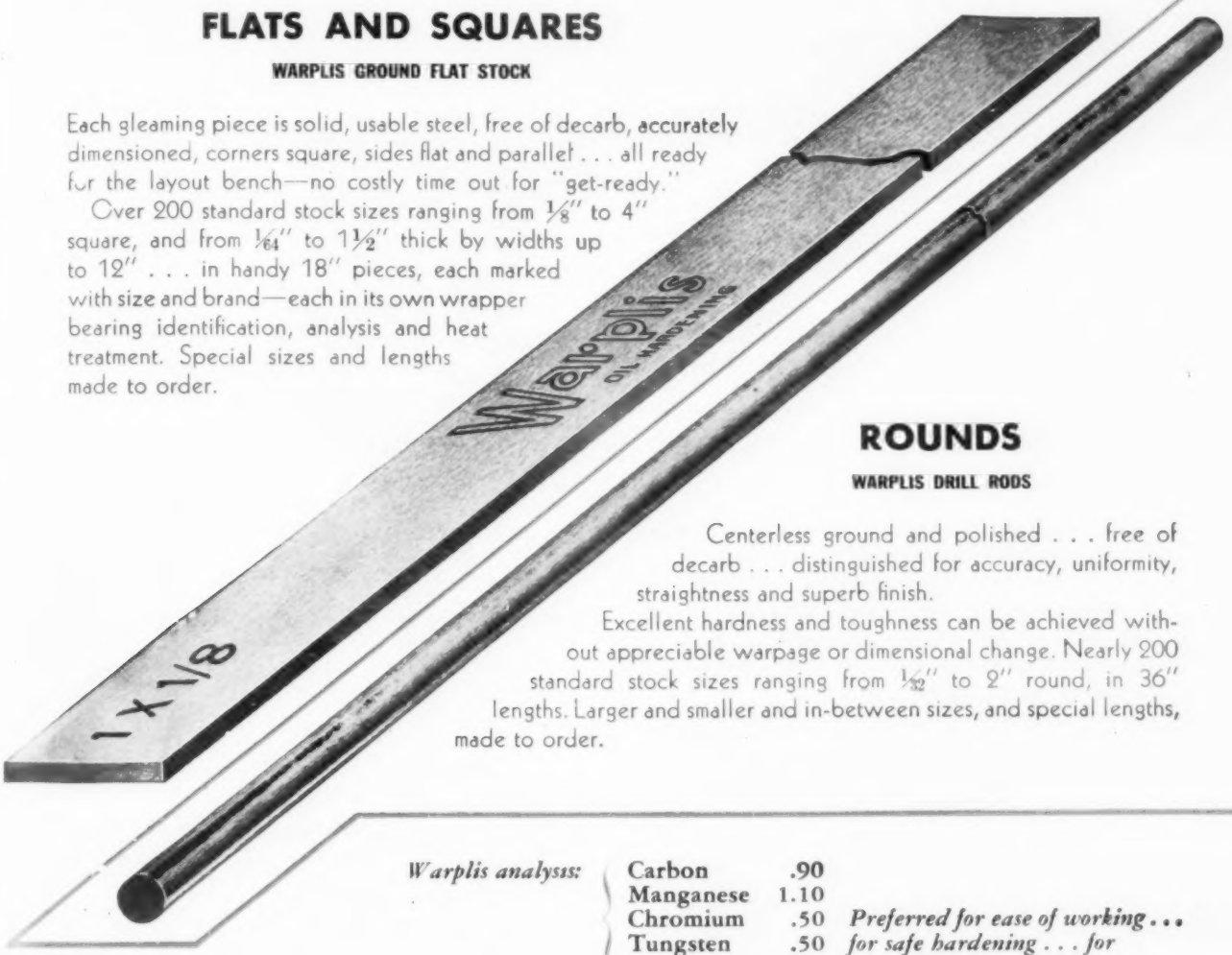
OIL HARDENING NON-WARPING TOOL STEEL

FLATS AND SQUARES

WARPLIS GROUND FLAT STOCK

Each gleaming piece is solid, usable steel, free of decarb, accurately dimensioned, corners square, sides flat and parallel . . . all ready for the layout bench—no costly time out for "get-ready."

Over 200 standard stock sizes ranging from 1/8" to 4" square, and from 1/64" to 1 1/2" thick by widths up to 12" . . . in handy 18" pieces, each marked with size and brand—each in its own wrapper bearing identification, analysis and heat treatment. Special sizes and lengths made to order.



ROUNDS

WARPLIS DRILL RODS

Centerless ground and polished . . . free of decarb . . . distinguished for accuracy, uniformity, straightness and superb finish.

Excellent hardness and toughness can be achieved without appreciable warpage or dimensional change. Nearly 200 standard stock sizes ranging from 1/32" to 2" round, in 36" lengths. Larger and smaller and in-between sizes, and special lengths, made to order.

Warplis analysis:

Carbon	.90
Manganese	1.10
Chromium	.50
Tungsten	.50
Vanadium	.15

Preferred for ease of working . . . for safe hardening . . . for fine performance.

Procedures may be simplified . . . time and money saved . . . by standardizing on these companion products of Tiffany-like quality for all tool and die requirements. From fine steel distributors everywhere. Size and price folders, and Warplis Notes on Hardening pamphlet, on request.

Also *Monaca* and *Dukane* water hardening drill rods • *Reliance* water hardening flat and square drill rods
High Speed drill rods

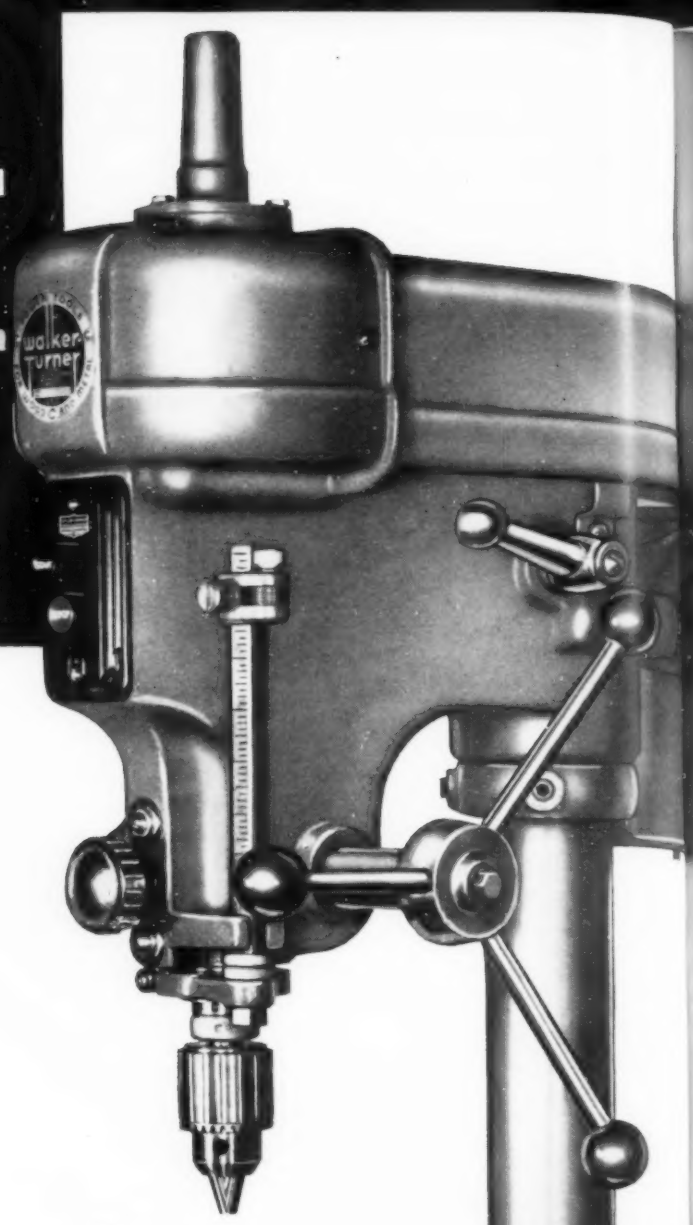
PITTSBURGH TOOL STEEL WIRE CO.

Since 1902 . . . makers of cold finished fine steels in all sizes, grades and shapes

MONACA, PA.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-239

Designed
for those who needed a
LIGHT-HEAVYWEIGHT
Machine



—that's the WALKER-TURNER line

For jobs where neither the capacity nor expense of a heavy industrial machine is warranted, and where a "hobby machine" would be wholly inadequate, Walker-Turner has engineered a special class of light-heavyweight power tools.

Professional in design and operation, yet light for production machines, the Walker-Turner "in-between" line gives industry the capacity needed for short-run production work, without the necessity of heavy investment. For complete information, write your name and address in the margin below.

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KEARNEY AND TRECKER CORPORATION
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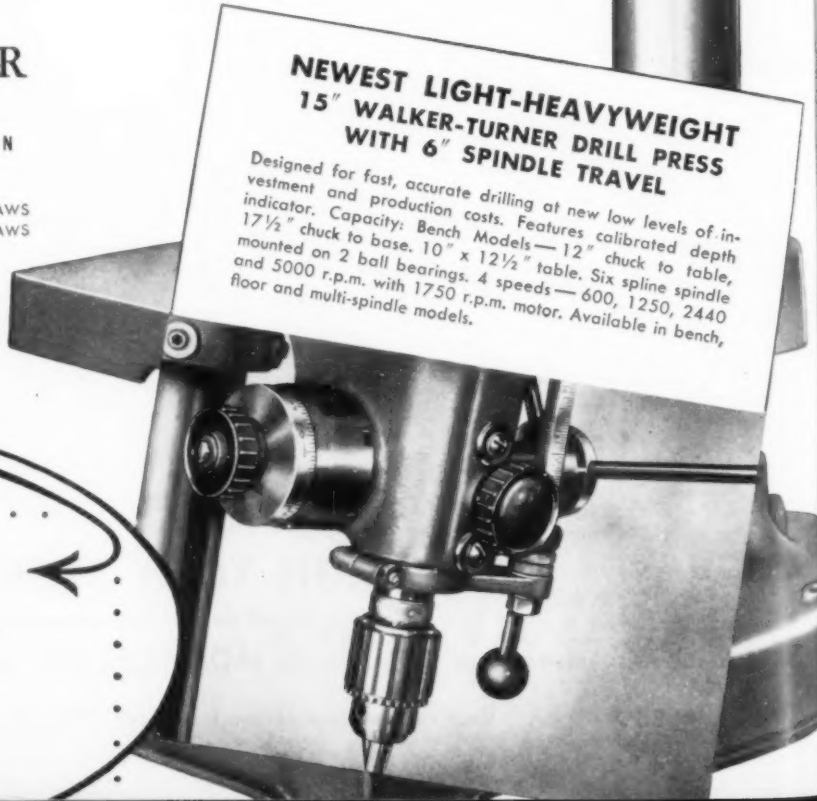
DRILL PRESSES • RADIAL DRILLS • TILTING ARBOR SAWS
BELT and DISC SURFACERS • METAL-CUTTING BAND SAWS
LATHES • SPINDLE SHAPERS • JOINTERS

SOLD ONLY THROUGH
***TRAINED* INDUSTRIAL DISTRIBUTORS**

NEWEST LIGHT-HEAVYWEIGHT
15″ WALKER-TURNER DRILL PRESS
WITH 6″ SPINDLE TRAVEL

Designed for fast, accurate drilling at new low levels of investment and production costs. Features calibrated depth indicator. Capacity: Bench Models — 12″ chuck to table, 17½″ chuck to base. 10″ x 12½″ table. Six spline spindle mounted on 2 ball bearings. 4 speeds — 600, 1250, 2440 and 5000 r.p.m. with 1750 r.p.m. motor. Available in bench, floor and multi-spindle models.



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to write for full details and specifications
Walker-Turner Division, Kearney & Trecker Corp.
Dept. T3, Plainfield, N. J.

(Please write your name and address in margin of page)

Standard symbols for **PRECISION**

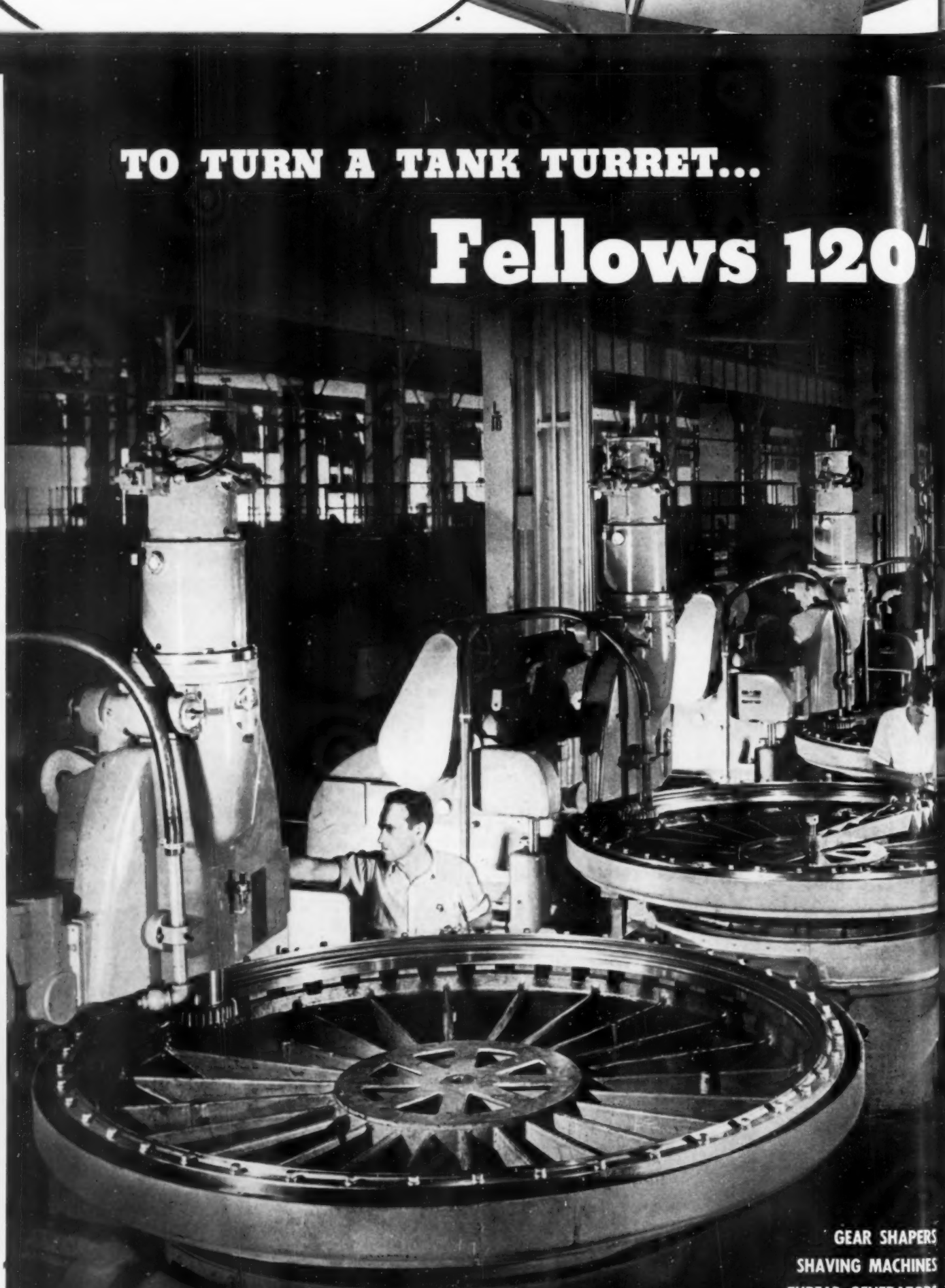
A "mike" and an Allen Key keep steady company wherever precision measurements and precision adjustments go hand in hand . . . and where positive locking and vibration-free performance are important to maintaining precision.

Look for the First Name in precision screws at the Industrial Distributor who stands first in *his* field in your locality. He has the stock, the experience, and a wealth of specific information on applications for precision fastenings that you will find invaluable.

WARNING
Allen-Type screws aren't necessarily Allen-Made.
Get genuine "Pressur-Formed" Allen Head screws in this black and silver box.

TO TURN A TANK TURRET...

Fellows 120"



GEAR SHAPERS
SHAVING MACHINES
THREAD GENERATORS
CUTTERS AND SHAVING TOOLS
GEAR INSPECTION INSTRUMENTS

PLASTICS MOLDING MACHINES

uts a Giant Gear

At the Chrysler Delaware Tank Plant, tank turret gears are accurately finish-cut with six Fellows 120" Gear Shapers.

Here are some of the reasons:

Only a minimum of set-up time is required on the Fellows 120-Inch. Fixtures are rigidly supported and readily accessible, resulting in increased cutting feeds and a saving of work handling time. Gears are roughed and finished in two cuts at one setting of the work. Tool maintenance costs are low, because cutters can be sharpened on any standard rotary surface grinder.

For intermediate, or larger gears, the speed and precision of the Fellows 36-Type, 48-Inch, or 100-Inch Gear Shapers may be the answer to your gearing problems. To learn how, write or call the Fellows office nearest you.

Fellows

THE FELLOWS GEAR SHAPER COMPANY • Head Office and Export Department • 78 River Street, Springfield, Vermont
Branch Offices: 323 Fisher Bldg., Detroit 2 • 5835 West North Avenue, Chicago 39 • 2206 Empire State Bldg., New York 1

JIG GRINDING ACCURACY *guaranteed**

INFINITE CONTROLLED SPEEDS
30,000 TO 65,000 R. P. M.

Easily connect jig grinder to jig borer or mill

Then you can finish grind in hardened steel to "tenths" . . . jig grind dowel holes square with a ground base . . . move location of holes in hardened steel blocks . . . jig grind interchangeable holes in hardened sections . . . grind small holes with diamond impregnated mandrels . . . grind contours and relief with tungsten carbide burrs . . . grind radii in die sections . . . eliminate jig bushings in tools where close spacing is essential.

Other infinitely controlled air driven spindle applications

Place spindle on most any machine. Use it for finishing contours on hardened steel working surfaces . . . burring or milling die castings . . . routing wood contours . . . carbide milling or finishing slots . . . finishing holes in hardened steel to "tenths" . . . grinding with diamond wheels, carbide burrs, or diamond impregnated mandrels.

Advantages—10 micro finishes using carbide mills . . . 6 micro finishes using mounted points, operates at any angle . . . air driven, air cooled, overheating prevented . . . speed controlled at optimum point . . . 3⅝" long motor uses little working space . . . By controlling speed at any point you abolish need for many constant speed spindles.

For immediate quotation please state machine tool application. Get this manual of photos showing operations Vulcanaire performs.

*Dependably accurate to "tenths"

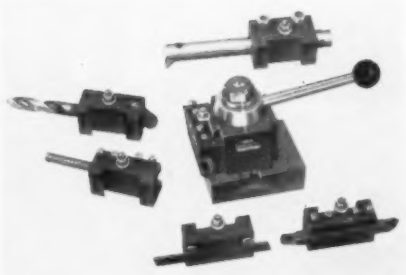
Vulcanaire
BUILT BY TOOLMAKERS FOR TOOLMAKERS

VULCAN TOOL CO., 7300 LORAIN ST., DAYTON, OHIO

USE READER SERVICE CARD; INDICATE A-3-244-1

ALORIS

TOOL POST and HOLDERS



A new time-saving tool post for any number of "Rough" thru "Finish" form operations . . . eliminates costly set-ups. Quickly interchangeable by simply sliding out one tool holder and slipping in another to the exact original pre-set position. Tool bits can be resharpened right in the holder without changing the set-up. Can be easily adjusted to any height without using shims . . . assures rigid set-up . . . ideal for toolroom and production . . . FITS ALL LATHES.

Prices include tool post and five tool holders.

Model B—Max. Tool Bit ½", Max. Boring Bar 1"	$ 98.00
Model C—Max. Tool Bit ⅞", Max. Boring Bar 1¼"	196.00
Model D—Max. Tool Bit 1", Max. Boring Bar 1½"	275.00

ALORIS TOOL Co., Inc. 80-82 FOURTH AVENUE NEW YORK 3, N. Y. GRamercy 7-7858

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Announcing our Exclusive Distributorship for SCRIVENER Grinding Machines
MADE IN ENGLAND

SCRIVENER
No. 2 8" x 18"
SUPER SURFACE GRINDER

For Toolroom and Production

PROMPT DELIVERY
Scrivener Super Surface
No. 2 Grinder

DIMCO

SCRIVENER Grinders—Surface, Centerless, Duplex and End-Forming types—are outstanding among fine machine tools, producing satin-smooth finish and "split-tenth" accuracy. The SCRIVENER Super-Surface Grinder illustrated, for example, is unusually rigid, eliminating vibration. The wheel is larger than customary, and the spindle on which it is mounted is extra large in diameter. Special design permits simplicity of control as well as great savings in set-up time.

Write us today for complete information on the entire SCRIVENER line!

KELVIN SYSTEMS CORPORATION 135 FRONT ST. NEW YORK 5, N. Y.
IMPORTERS OF MACHINE TOOLS
RADIAL DRILLS • MILLERS
TURRET LATHES • GRINDERS
SHAPERS • COPYING LATHES

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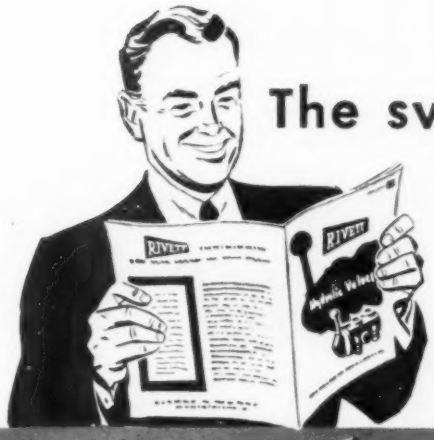
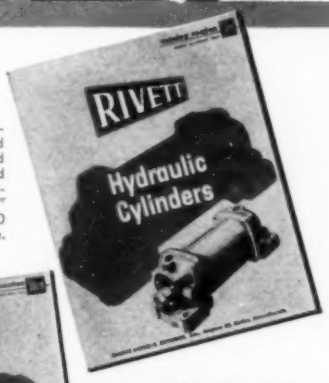


The sweetest story ever told—

on AIR and HYDRAULIC POWER!

Rivett Hydraulic Cylinder Catalog Section 105—
Details: Cushioned and non-cushioned, standard rod and 2:1 over-size rod, single and double end rod, internal and external threads, all standard mountings in 2" to 10" bores. Offered for 1500 P.S.I. 3000 P.S.I. available.



Rivett Hydraulic Valve Catalog Section 203—
Details: 4-way, 3-way, pilot, and remote valves in 6 types of operation, 4 types of action, 7 sizes, 5 piston designs. Offered for 1500 P.S.I. 3000 P.S.I. in most models.

These five books, totaling 68 pages, are jam-packed with all the important and necessary data required to lay out successful air and hydraulic circuits. Over 400 Rivett models, in a variety of sizes, are detailed — every standard air and hydraulic component offered in the industry. Description of each model includes working drawings, specifications, and cutaway views. All data pertaining to each model is shown on one page to facilitate layout. Easy to use, complete in information, these Rivett catalogs are a must on every board. Write to Rivett Lathe & Grinder, Inc., Brighton 35, Boston, Mass.

439 standard Rivett models described!

—All the necessary components for any efficient circuit.

Rivett Hydraulic Power Unit Catalog Section 400—
Details: Single, double and combination pump types. Single—.4 G.P.M. to 40 G.P.M. at 1000 P.S.I. Double—3.5 G.P.M. to 48 G.P.M. at 1000 P.S.I.

Rivett Air Cylinder Catalog Section 55—
Details: Cushioned and non-cushioned, single and double end rods, internal and external threads, 7 standard mountings in 1½" to 12" bores. Offered for 150 P.S.I. air and 300 P.S.I. oil services.

Rivett Air Valve Catalog Section 303—
Details: 4-way and 3-way, pilot and remote valves in 5 types of operation and in 5 sizes. Offered for 150 P.S.I. service.

Rivett Lathe & Grinder, Inc., Brighton TE-3, Boston, Mass. Please send me:
☐ Hydraulic Cylinder Catalog 105 ☐ Hydraulic Valve Catalog 203 ☐ Hydraulic Power Unit Catalog 400 ☐ Air Cylinder Catalog 55 ☐ Air Valve Catalog 303

Name_____ Company_____

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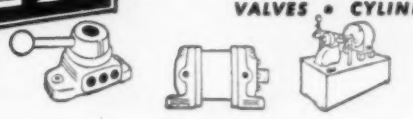
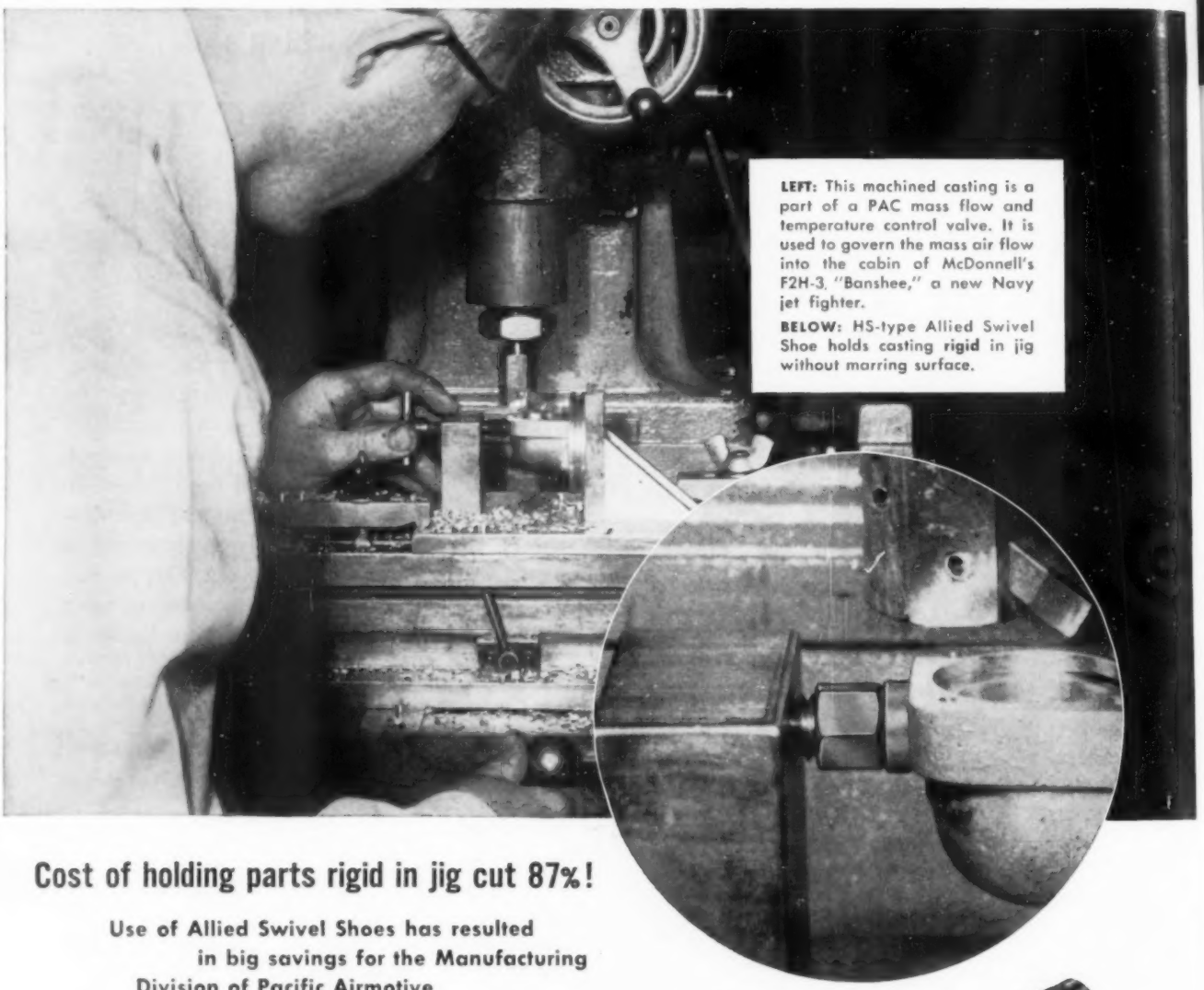
RIVETT furnishes a complete power package

VALVES • CYLINDERS • POWER UNITS

Air and Hydraulic
All sizes and types



Allied Swivel Shoes help Pacific Airmotive Corporation get a "tight grip" on tooling costs!



LEFT: This machined casting is a part of a PAC mass flow and temperature control valve. It is used to govern the mass air flow into the cabin of McDonnell's F2H-3, "Banshee," a new Navy jet fighter.

BELOW: HS-type Allied Swivel Shoe holds casting **rigid** in jig without marring surface.

Cost of holding parts rigid in jig cut 87%!

Use of Allied Swivel Shoes has resulted in big savings for the Manufacturing Division of Pacific Airmotive Corporation, Burbank, California.

Formerly, parts were held in jigs and fixtures with makeshift swivel shoes machined on the job. Cost-conscious tool designers at PAC standardized on mass-produced Allied Swivel Shoes, eliminating this costly custom machining.

Parts are now positioned faster and held tighter without marking or burring the surface. *The cost is less than ⅛ the cost of the old method!*

This same big saving can be yours!

Every shop can use these new cost-cutters. Thousands now in use on mill fixtures, drill jigs, shop tools, screw turrets, etc. They're rust proof and hardened for long life; *can be used over and over!* Ask your industrial distributor for Allied Swivel Shoes today.

Now 4 types available!

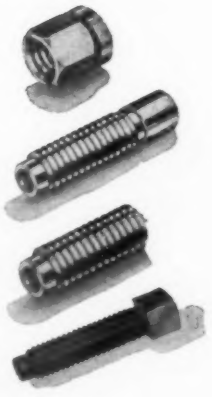
H-S SERIES: Hexagon nut with precision-fitted shoe.

S-S SERIES: Socket-head screw with precision-fitted shoe.

N-H SERIES: Set-screw with precision-fitted shoe.

S-H SERIES: Square-head screw with precision-fitted shoe.

All types are available in a wide variety of diameters and lengths.



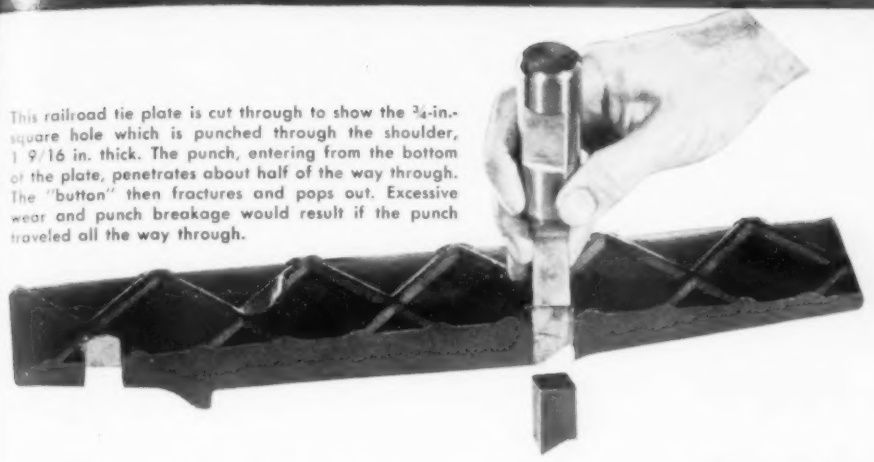
Allied Swivel Shoes

ALLIED AIR PARTS

662 North Robertson Boulevard, Los Angeles 46, California

Tool Steel Topics

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation



This railroad tie plate is cut through to show the ¾-in.-square hole which is punched through the shoulder, 1 9/16 in. thick. The punch, entering from the bottom of the plate, penetrates about half of the way through. The "button" then fractures and pops out. Excessive wear and punch breakage would result if the punch traveled all the way through.

Omega Adds 5 Lives To Rugged Punches

When a punch can average only 54 holes before failure, you would figure that the job is a tough one. And you would be right. Punching ¾-in.-square holes through 1 9/16-in. of tough steel in railroad tie plates is no job for an ordinary tool steel.

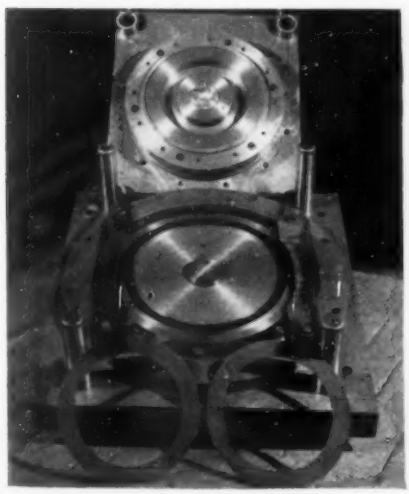
One of our metallurgical contact men studied this severe punching operation and recommended the use of our Omega tool steel. He pointed out to the shop men that it takes a shock-resisting tool steel — and a good one — to punch a hole that's smaller in diameter than the thickness of the steel. And in this case the steel plate is twice as thick as the width of the ¾-in.-square hole.

The first few punches made from Omega averaged well over 100 holes. So they made up 102 Omega punches and used them on a production basis. These produced 2 holes each in 18,160 plates — an average of 356 holes per punch, and more than 5 times the service life of the steel previously used.

This is another example of the way Omega can master heavy-shock applications. It's been doing a fine job for years on such tools as: pneumatic chisels, pawls, punches, knockout pins, swaging dies, shear blades, clutch and machine parts.

Omega is tops for cold-shock jobs. Your Bethlehem tool-steel distributor carries Omega in his stock for fast delivery. Its typical analysis:

C	Mn	Si	Mo	Va
.60	.70	1.85	.45	.20



⬅ Blanking High-Carbon Sheets

The excellent shock-resisting properties of our 67 Chisel make it a good choice for the blanking of clutch-plate discs from .09-in., high-carbon sheet steel. Operating in a 350-ton press, this die produces about 30,000 pieces before any redressing is needed. The die is hardened to Rockwell C-53.

Despite its reputation for shock applications, 67 Chisel has plenty of wear-resistance for blanking tools, punches, swaging dies, hot-work tools, shear blades and master hobs. It's easy to carburize 67 Chisel whenever extra wear-resistance is needed . . . without sacrificing its tough core.

Stocked by Bethlehem tool steel distributors, 67 Chisel is easy to machine and heat-treat. Its typical analysis:

C	Si	Cr	W	V
.50	.75	1.25	2.50	.20

Dies That Hold Their Size

Being machined is a piece of Lehigh H for a progressive die that will blank, form and draw a precision part from 3/16-in. steel strip. When you machine a piece of our Lehigh H tool steel you can be sure that it's going to hold those accurate dimensions during heat-treatment. Distortion and warpage are held to the very minimum.

This high-carbon, high-chromium grade is also first choice for long wear and high compressive loads. And because Lehigh H is air-hardening there's little chance of quenching-cracks, even when dies have intricate designs.

Lehigh H is stocked in many sizes by Bethlehem tool steel distributors everywhere. Its typical analysis:

C	Cr	Mo	V
1.55	11.50	.80	.40

BETHLEHEM TOOL STEEL ENGINEER SAYS:

It's better to grind round tool steel bars than to cold-draw them.

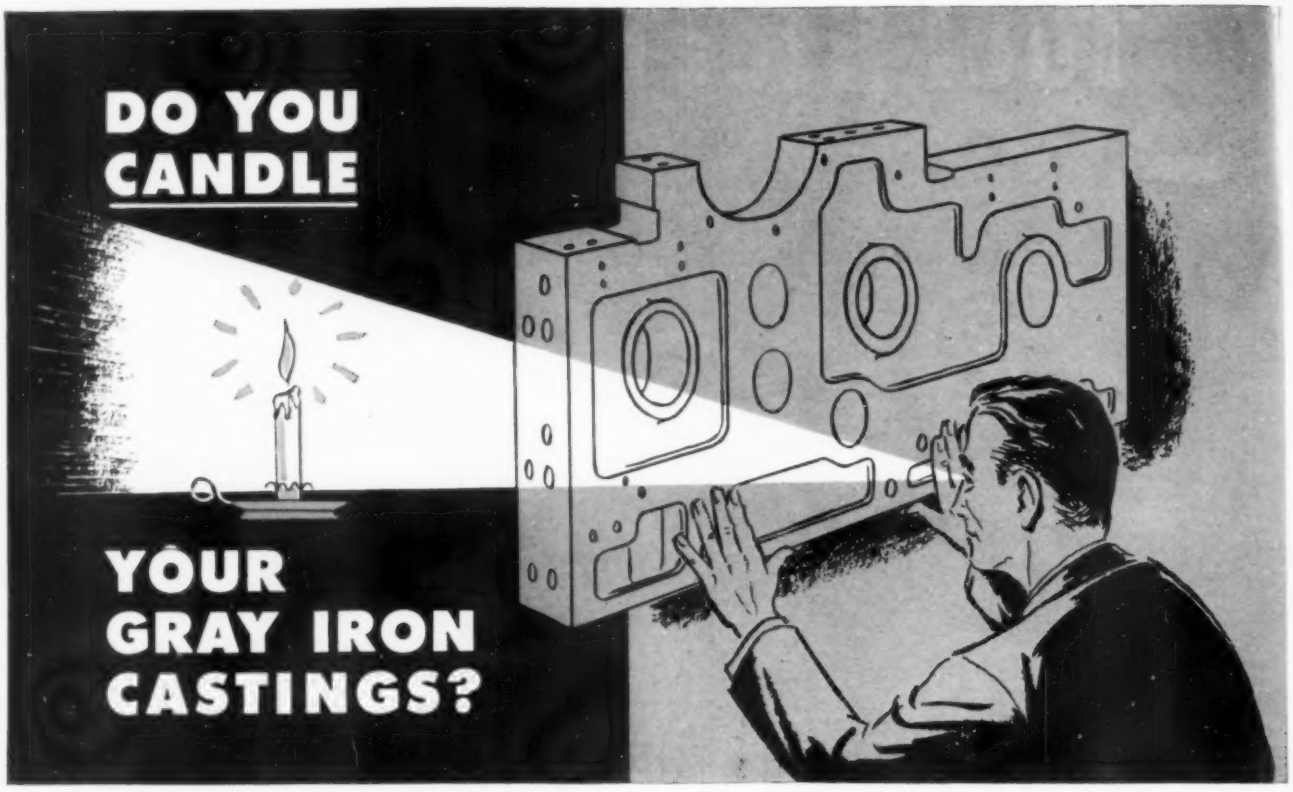
Because tool steel is inherently hard and brittle, it's ordinarily best not to specify that it be furnished in the cold-drawn condition. When very close size-tolerances are required, round bars are sometimes cold-drawn.

However, cold-drawing does *not* remove minor surface defects or decarburization. The surface of a cold-drawn bar must be machined off — just as with a hot-rolled bar — before tools are heat-treated. Otherwise, tools may crack in heat-treatment and will have a soft "skin."

It's better to finish round bars by centerless grinding, because the grinding does remove minor surface defects and decarburization. Tools can be made from ground bars without first machining off the surface.

Tool steel in sections other than round must usually be furnished cold-drawn if tolerances have to be close, because such sections as flats and squares cannot be surface-ground economically.

DO YOU CANDLE YOUR GRAY IRON CASTINGS?



If you do.....

You are in a position to save the machining expense which results from internal defects and poor metallurgical control—and the "bargain price" casting frequently shows up as a mighty costly one!

If you don't.....

Then you are depending on the ability of your casting supplier to deliver consistent soundness and machinability. Hansell-Elcock Structure-Controlled Iron fills these needs at low cost, in weights from fifty pounds to twenty tons. Give us a call at CA 5-7000 (Chicago).

Our 65th Anniversary

In Need of Structural Steel? Consult HANSELL-ELCOCK CO.

Fabricators of Structural Steel for Institutional, Commercial, Manufacturing, Public and Private Buildings • Power Plants • Bridges • Special Purpose Installations and Equipment for Industry.

Excellent Facilities • Unequalled Experience • Fine Workmanship • A Record of Integrity.

When the job calls for Structural Steel, Consult HANSELL-ELCOCK CO., Fabricators for 65 years.

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HANSELL-ELCOCK COMPANY

SERVING INDUSTRY SINCE 1888

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NUT SETTERS

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GRINDERS

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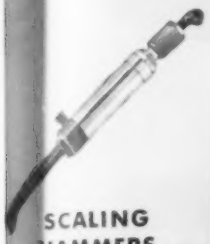

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PORTABLE TOOLS FOR INDUSTRY

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The past 25 years have established the Rotor Tool reputation of "better portable tools for industry".

From the day of pioneering the first rotary type grinder, to a full and extensive line means customer acceptance and customer approval.

Produced in the industry's most modern, air-conditioned plant to give "tops in precision".

Write for any of the following catalogs:

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No. 36—360-cycle Electric Tools

Special bulletins on specific tools.

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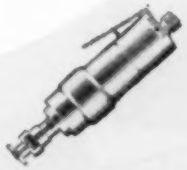
ANGLE DRILLS

VERTICALS

MIDGET DRILLS

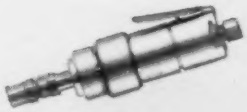
RAMMERS



MIDGET GRINDERS

STONE GRINDERS

BURRING



MIDGET GRINDERS

EXTENSION GRINDERS

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GRINDERS

THE ROTOR TOOL CO.

CLEVELAND, OHIO

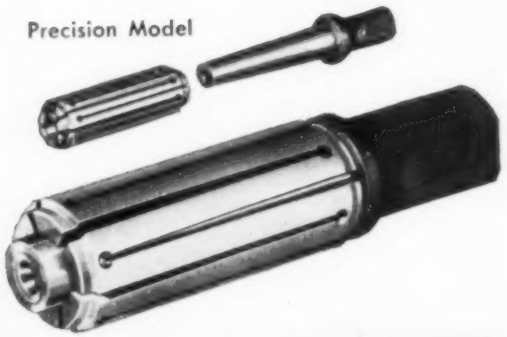
UNBIASED ANALYSIS OF PORTABLE TOOL PROBLEMS

Work savers-cost cutters job speeders-in any shop

Save time spent tooling up solid mandrels. CHAMPION mandrels automatically expand to exact, positive, concentric fit as the flexible sleeve is moved along the tapered arbor. Work quickly set up; easily taken down. Production costs cut, whether the job calls for machining only one piece or ten thousand pieces.

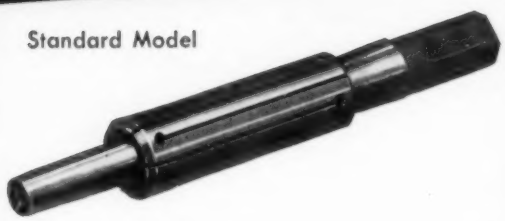
Precision Model positively guaranteed for precision grinding, turning and milling operations. Ideal where accuracy and time-saving are of utmost importance. Available in standard sizes from ½" through 3" diameter, graduated by 1/16". Arbor built for heavy loads. Sleeve has range of .010", from .003" under to .007" over nominal size. Positive stop at maximum size prevents overstrain. Holds tolerances of .0002" run out. Withstands hardest wear; permanent accuracy is assured.

Precision Model



CHAMPION E-X-P-A-N-D-I-N-G MANDRELS

Standard Model



Standard Model used throughout the world. Standard tool room equipment in all phases of modern industry. A set of twelve will completely and accurately fill any hole from ½" to 7" diameter — replace hundreds of solid mandrels costing many times as much. Show negligible wear after years of use. Maintain close tolerances; handle material of any length bore, hard or soft metals, from thin tubes and bushings to heavy castings and forgings.

CHAMPION *Expanding Mandrels can be made in special shapes and sizes to fit any specification. Quotations on request. When writing, please address Dept. 100.*

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A HUNDRED JIGS IN ONE with CARDINAL SPEED-WISE

EXCLUSIVE FEATURES

1. Saves time—one hand operation—"lift, slide, lock!"
2. Saves tooling expense—smaller, simpler jigs.
3. Saves space in tool crib.
4. Indispensable for toolroom work in addition to production.

SOLD ONLY THROUGH RECOGNIZED DISTRIBUTORS.

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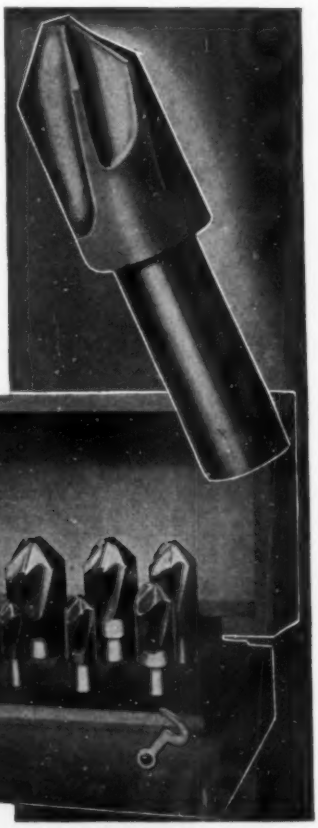
They are terrifically popular because the six staggered cutting edges are scientifically designed to give a shearing cut and thus eliminate all chatter.
Made in 12 sizes in all degrees; also supplied as sets in strong Kit-cases.



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"Darling, Dad says our elopement is almost as economical as his

Logan LATHES!"

No. 935—2
QUICK CHANGE GEAR TURRET LATHE
11" Swing, 1" Collet Capacity,
1⅝" Spindle Hole, 43⅛" Bed

NO OTHER LATHE of comparable specifications can match the Logan in economy. Low power cost is only one reason why industry likes the Logan. It is easily set up for every type of lathe operation. Its ball bearing spindle needs no adjustment for any speed from 45 to 1500 rpm, a feature that saves maintenance costs and prolongs spindle accuracy. Vital wear points throughout the lathe are protected by self-lubricating bronze bearings. The lasting accuracy that results from rugged, accurate overall construction keeps production at peak efficiency and holds costs down. With its 11" swing and 1" collet capacity the economical Logan can hold the costs as well as the tolerances on much of your lathe work.

See your Logan Dealer, or Write for the Logan Lathe Catalog

LOOK TO LOGAN FOR BETTER LATHES AND SHAPERS

LOGAN ENGINEERING CO.

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DIAL FOR ACCURATE

High Speed Inspection

Depth Gage. Readings to 1/1000th.

1" Range Dial Indicator. Adaptable to many tools. Readings to 1/10,000th.

When your production must be held to close tolerances there's a Tumico Dial Indicator gage that will make high speed, accurate inspections. High visibility dials give instant and accurate readings. Our complete and diversified line may provide exactly the right type of dial indicator gage to best speed and insure accurate inspections.

Let our engineers examine your product inspection problem. Write for new catalog showing additional models.

DIAL FOR ACCURATE

High Frequency Checking

1" Range Dial Indicator. Attaches to many tools. Readings to 1/1000th.

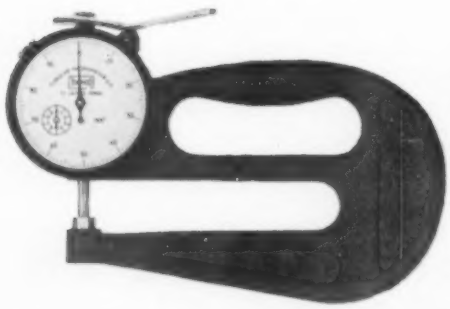
Lever Action Hand Thickness Gage with 1" Throat Depth. Readings to 1/1000th.

"Quality Control" of production lines can often be improved and speeded up by frequent spot checking with Tumico Dial Indicator hand and bench gages. High visibility assures quick, accurate readings to check vital production points.

Our production engineering department may be able to help you. Write us your problem. Our recommendations and complete catalog showing gages not illustrated will be sent promptly.

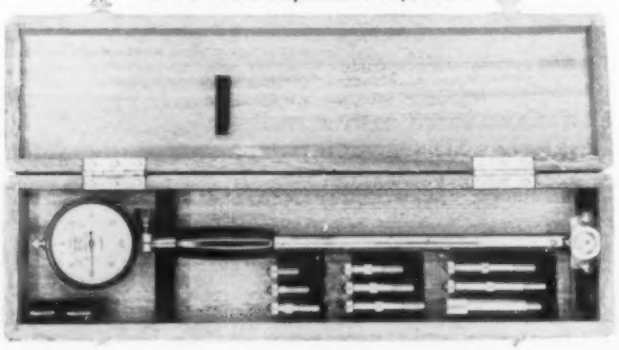
TUMICO DIAL INDICATORS

TUBULAR MICROMETER CO., Box 60, St. James, Minnesota



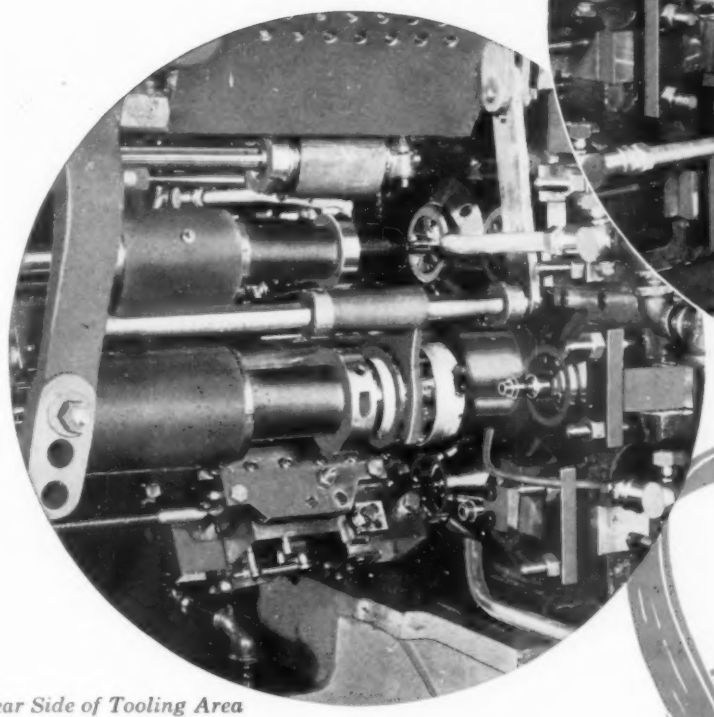
Lever Action Hand Thickness Gage with 4" Throat Depth. Readings to 1/1000th.

Dial Bore Depth Gage. Range from 2" to 6" in 10" Bore Depth in 5/10,000ths.



MORE IN ONE BASKET

Front Side of Tooling Area



Rear Side of Tooling Area

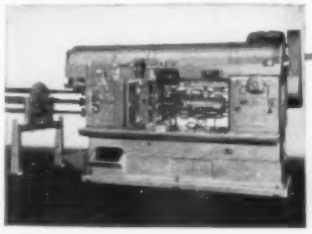
The "automatic" has substantiated many of the advantages of centralized responsibility in metal turning.

Even the earlier users realized that more work pieces can be profitably placed in one basket *if nothing upsets the basket.* Dependable performance has always been vital to the successful use of the "automatic".

The factors that determine the degree of dependability of an "automatic" are a very important part of its specifications. They are a part of the *complete* information available on CONOMATICS.

In producing the above part on a 1⅝"-SIX, the cycle time of 14 seconds per piece is not as important as the total time necessary for the entire run. Dependable performance pays.

A Comparison of ALL Automatics is in Favor of Cone



Conomatic } CONE AUTOMATIC MACHINE COMPANY, INC. WINDSOR, VT., U.S.A.

NOW! A Long-Sought Production Aid from industry's most complete line of filtration equipment

HOFFMAN Vacu-matic FILTER

for automatic, continuous filtering of water soluble coolant from grinders, hones and other machine tools

Write for Bulletin A-915

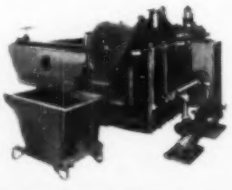
Once again Hoffman meets your particular filtration problem with equipment specifically designed for the job! The "Vacu-matic," a continuous suction, endless belt filter, serves individual machines with clean coolant *automatically*. Uses vacuum (not gravity) for high flow rates — coolant is drawn through belt which deposits solid particles as dry sludge in tote box for easy removal.

Air moving through the filter belt not only dries the sludge, it keeps coolant at or below room temperatures—reduces bacteria common to dirty coolant. The "Vacu-matic" is complete, compact, ready for hook-up on present machines. Two sizes — for 20 g.p.m. and 40 g.p.m.

High Flow Rate • Self-Cleaning
Dry Sludge • Keeps Coolant Cool

Hoffman's nationwide staff of filtration engineers is ready now to give you details on how "Vacu-matic" can protect the production of your machine tools. Like all Hoffman specialized filtration equipment, the "Vacu-matic" is designed to pay for itself by reducing down time, extending tool life, and safeguarding quality control. Write today for free technical bulletins.

For Groups of Machines
HOFFMAN FLOTATION SYSTEMS—*20 to 1,000 g.p.m.*
Fully Automatic
Write for Bulletin A-690



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INDUSTRIAL FILTRATION EQUIPMENT & SERVICE
U. S. HOFFMAN MACHINERY CORP., 227 LAMSON STREET, SYRACUSE 6, N. Y.
In Canada: Canadian Hoffman Machinery Co., Ltd., Newmarket, Ont.

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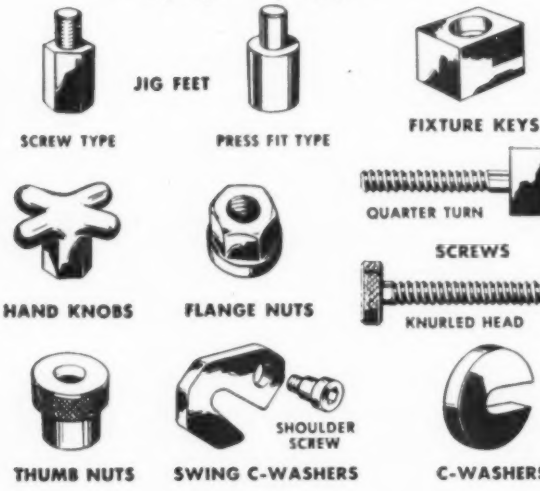
TTCO *Standard Parts for* JIGS & FIXTURES
a size for every job



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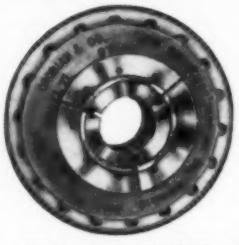

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Works as an ARBOR or POT FIXTURE—either ID or OD—close tolerance—.0005 guaranteed, many report .0002—saves time, increases accuracy, cuts rejects, reduces costs.

Rapidly gaining nationwide acceptance . . . a few sales territories still open . . . just address:

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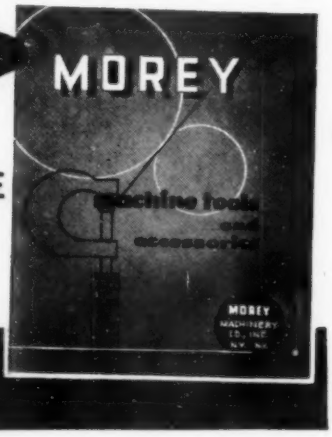
MOREY COMPLETE MACHINE TOOL CATALOG

Available upon request. Please write on your business letterhead.



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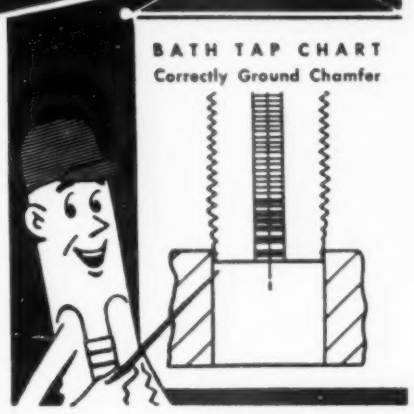
TAP-ODDITIES



At work — the taps with chatter marks,
Pete doesn't give a damfer.
He always specifies Bath Taps
For a smooth, clean-cutting chamfer!

At home — Pete cannot quite control
Dull "chatter" by his Wife.
The "waste material" she picks up
Is shortening poor Pete's life!

An important phase of Bath tap manufacture is chamfering — or, the grinding of the tapered outside diameter at the front end or point. The grinding is smooth when cutting away the crests of the first few threads — you'll find no chatter marks to pick up material or load. All Bath Taps are carefully checked at the plant for length of chamfer or number of threads specified.

Taps will dull with everyday use — and it is well to keep these things in mind:

Is the chamfer sharp?

Is the chamfer the right length?

Is the point diameter right for the size hole to be tapped?

Only one thread should enter to get full benefit of the chamfer. Too small a diameter throws the burden of cutting on a few threads in the chamfered section. Result — a harder working tap, higher tap breakage and bad threads.

Start the job right — insist on Bath ground from the solid Taps and Gages — they're made for precision and long wear.

INSIST ON BATH TAPS
—PROFIT BY THEIR
PLUS—PERFORMANCE

JOHN BATH CO INC · WORCESTER · MASS ·

PLUG AND RING THREAD GAGES • GROUND THREAD TAPS • INTERNAL MICROMETERS

JOHN BATH CO. INCORPORATED

28 Grafton St., Worcester, Mass.

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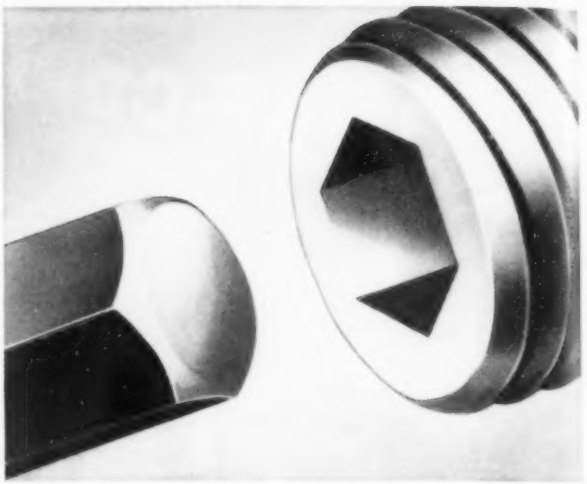
BRISTOL'S HEX SOCKET SCREWS

Meet every requirement of DESIGN, PRODUCTION, *and* MAINTENANCE

Bristol makes a complete line of socket screw products in sizes from 0 wire to 1 in. in diameter. Standard and listed sizes are stocked in heat-treated alloy steel. Brass, bronze, monel, stainless steel, etc.; are furnished on special order. All Bristol screws are carefully designed to close tolerances (A.S.A. approved, Class 3 fit) and precision-threaded either National Coarse or National Fine.



HERE'S WHAT BRISTOL'S HEX SOCKET SCREW DOES FOR

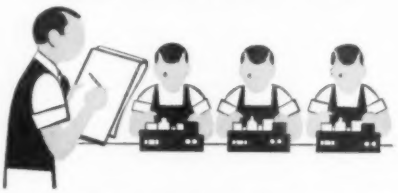
THE DESIGN ENGINEER

- ✔ withstands shock
- ✔ gives neater, more streamlined appearance
- ✔ provides stronger fastening
- ✔ permits more compact design
- ✔ withstands vibration

THE PRODUCTION ENGINEER

all of the above, *plus*...

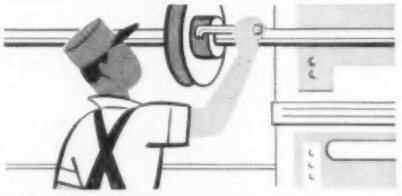
- ✔ saves time
- ✔ provides faster and easier assembly
- ✔ makes for less rejects
- ✔ prevents wrenches from slipping and marring surfaces



THE MAINTENANCE MAN

all of the above, *plus*...

- ✔ provides easy disassembly
- ✔ makes for greater safety



Write for free bulletins showing applications. Only Bristol makes *both* Multiple-Spline and Hex... for severe and regular service.

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BRISTOL'S SOCKET SCREWS

Multiple-Spline and Hex Socket Screws. Cap and Set

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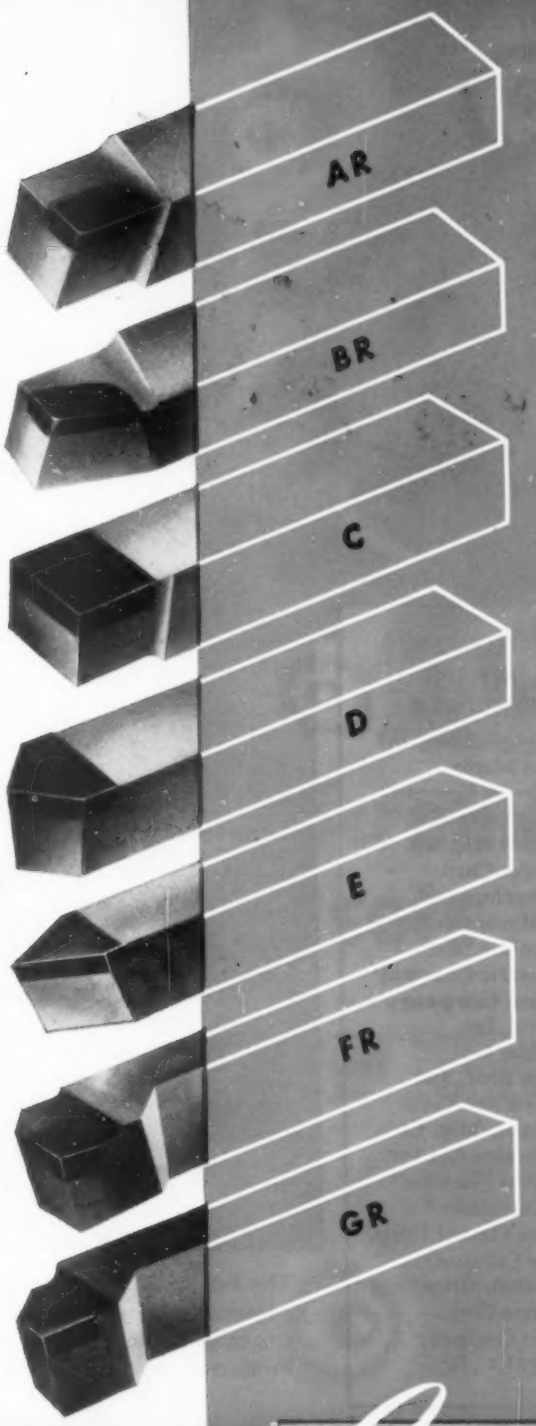

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You can't realize the value of these advantages until you use this air gage

ASK THESE COMPANIES HOW THEY LIKE THE DIMENSIONAIR

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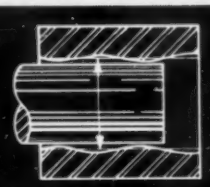

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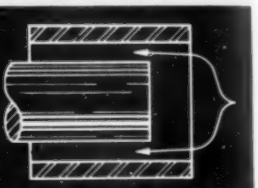
Approximately .002" • Plug fitted better to suit tolerances • More leeway before reaching finished size • Use same plug on rough and finished dimensions.



GREATER CLEARANCE
.0018" up to .0038" • Easier to insert plug and check taper, out-of-round, etc. • Plug doesn't stick in irregular-shaped holes.

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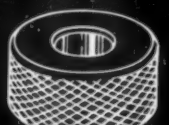
Doesn't fluctuate with air line pressure variations • No pointer flutter.

LONGER PLUG WEAR
Jet faces are deeper — a feature which really saves plug costs.



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The FEDERAL Dimensionair *is* an exceptional air gage with *many outstanding* advantages. We ask you to try the Dimensionair yourself and to compare it with any other air gage. Write today for complete information and prices. Federal Products Corporation, Providence 1, R. I.

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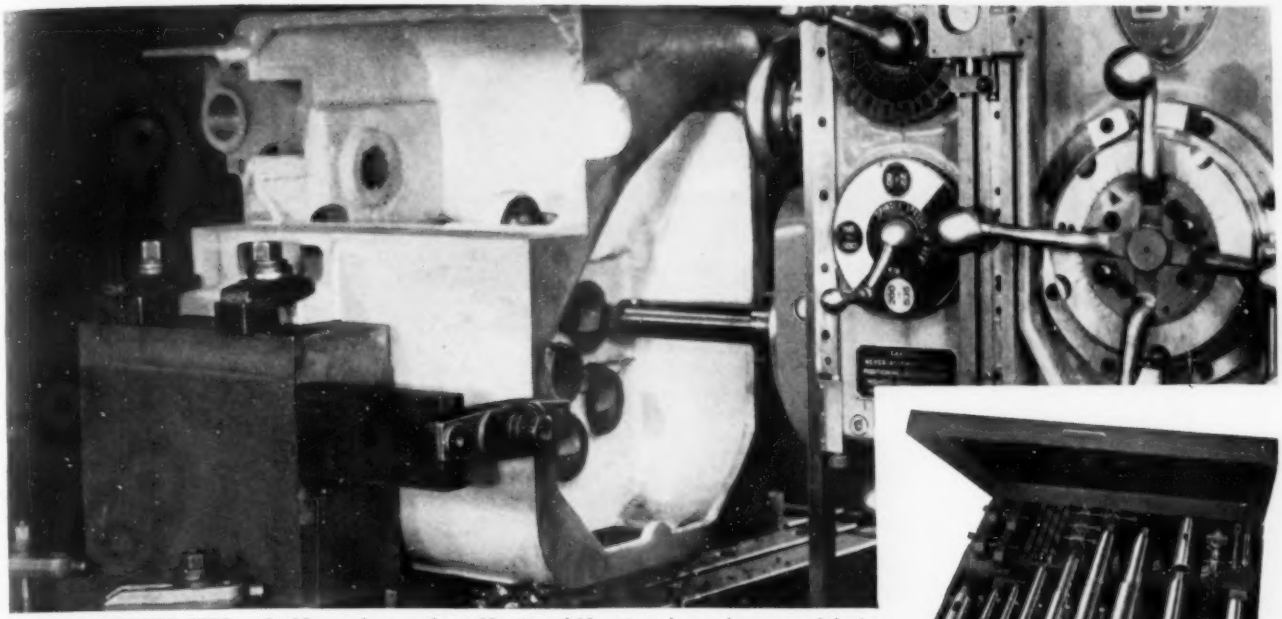
Stop "cut and try" boring



ALL INCLUSIVE SETS — Set No. 11, inset, and sets No. 10 and No. 12, each contain seven stub boring tools covering a boring range from 1¼" to 7" . . . plus an offset boring head for small pencil boring, light extended boring up to 13" in diameter, and for facing operations. Sets also contain reducing sleeves and such set-up items as parallels, adjustable stop-jacks and tee-slot parallel blocks.

Use DAVIS "Super" Micrometer stub boring tool sets

- ✓ **Adjust to within .0001".**
- ✓ **Rugged for heavy boring.**
- ✓ **Precise for fine finishes.**
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- ✓ **Stellite, tungsten or super high speed cutters also available.**

THE handiest production boosting tool sets on the market. For use with horizontal boring, drilling and milling machines . . . vertical or horizontal boring machines . . . turret lathes . . . vertical turret lathes . . . or milling machines. Available for almost immediate delivery. Modifications in any set can be made to meet your exact requirements.

ABBREVIATED SETS—Set No. 18 and set No. 19 each contain seven rugged tools covering a range from ⅜" to 7" diameter with the largest tool arranged to receive pencil boring tools for small diameter boring.

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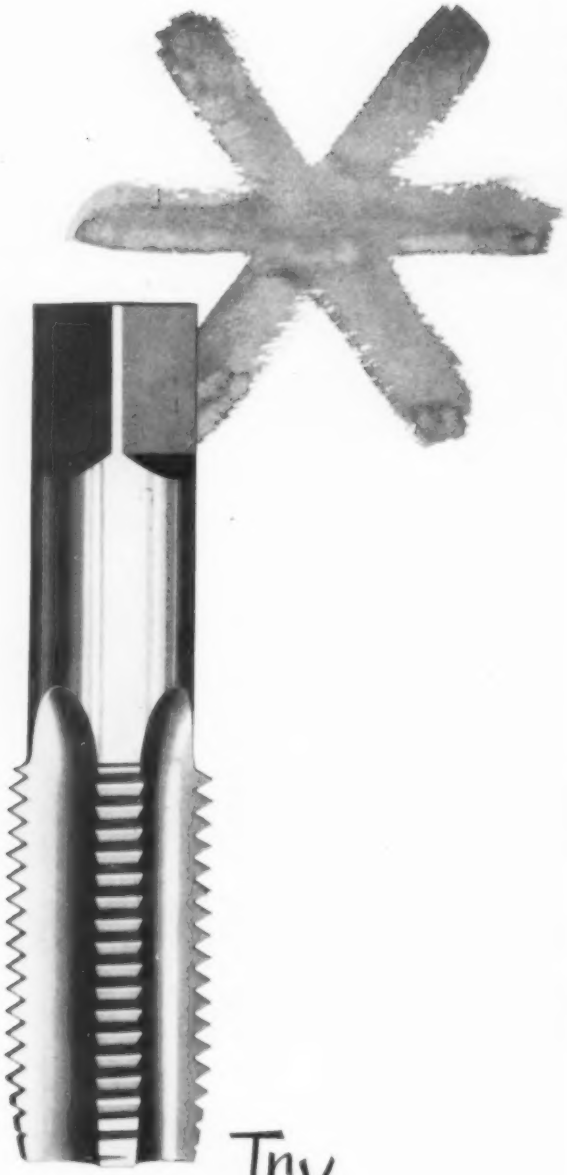

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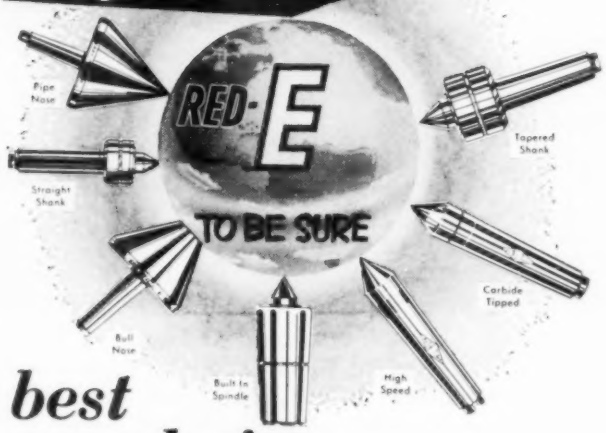

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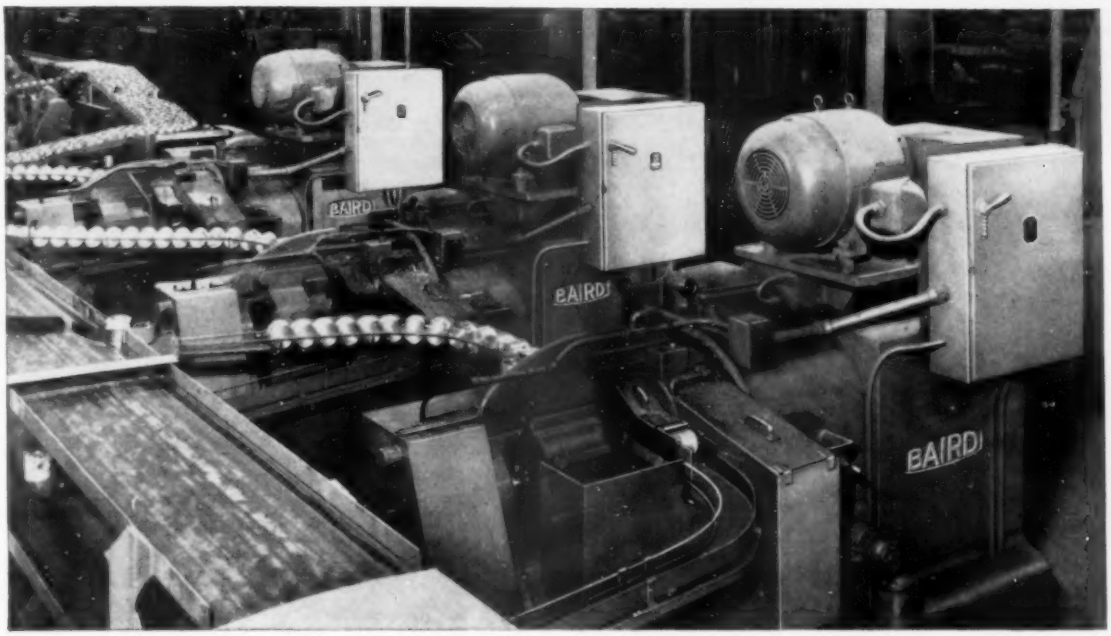

BAIRD *Automatic* CHUCKING MACHINES

Join mass production lines at new FORD plant

The Baird Machine Company is pleased to share, with other manufacturers of modern automatics, in the high speed production at the Ford Motor Company's new Cleveland Engine Plant.

Shown above is a battery of Baird Chucking Machines. They completely finish-turn the engine piston, and finish the oil ring grooves to size. Machines are automatically loaded from the conveyor and automatically discharge the pistons when they are completed. Operations are fast, continuous, and to close-tolerance machining.

The Baird 76H Chucker (7"-chuck, 6-spindle, horizontal machine) combines, in a single automatic indexing cycle, such operations as turning, facing, drilling, tapping, threading, grooving, and chamfering . . . if desired. Automatic electrical and mechanical safety devices prevent damage when setting up, when loading is not within cycle time, or when any motions are out of sequence.

Other valuable features are: easy access to all tooling, individual tool slides, individual spindle speeds, automatic chucking, maintained accuracy over a long service life.

If you require repetitive production of this nature . . . either hand load and unload, or entirely automatic . . . ask Baird engineers for details.

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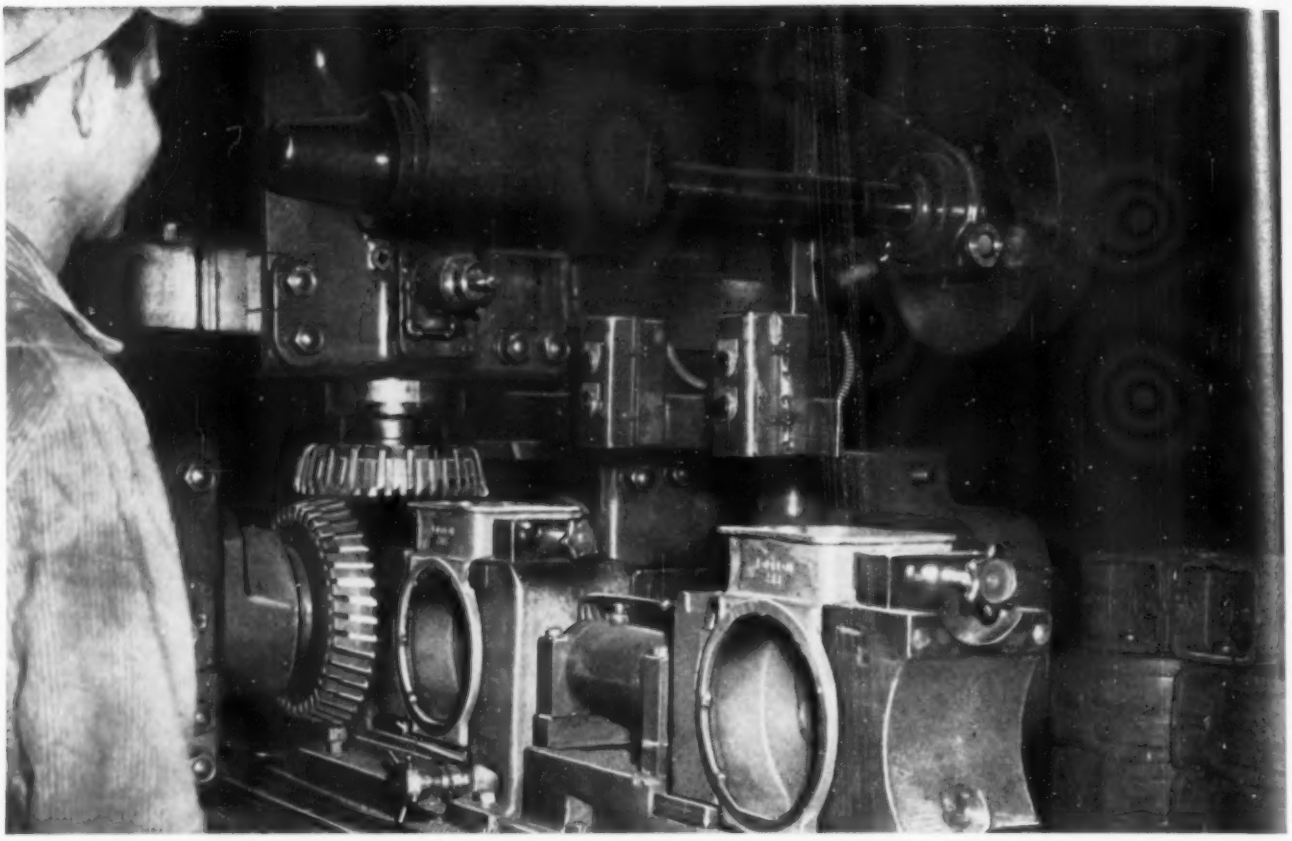

450 pieces per grind...

Despite Vibration

HAYNES STELLITE alloy milling cutter blades are being used successfully to machine gas-meter bodies, despite considerable vibration. The meter bodies have thin walls with respect to their other dimensions, and even though they are held in a rigid fixture, vibration cannot be completely eliminated. HAYNES STELLITE alloy tools have the toughness to withstand the chatter and also the red hardness to do the job fast.

Three milling heads, each containing 36 standard HAYNES STELLITE blades, face the flange at the top of the meter and straddle mill the two sides simultaneously. The tools previously used produced as few as 14 pieces per grind. HAYNES STELLITE tools produce an average of 450 pieces.

For information on how to use HAYNES STELLITE tools on your machining jobs, write for the new manual, "HAYNES STELLITE Metal-Cutting Tools."

HAYNES TRADE-MARK *alloys*

Haynes Stellite Company
A Division of
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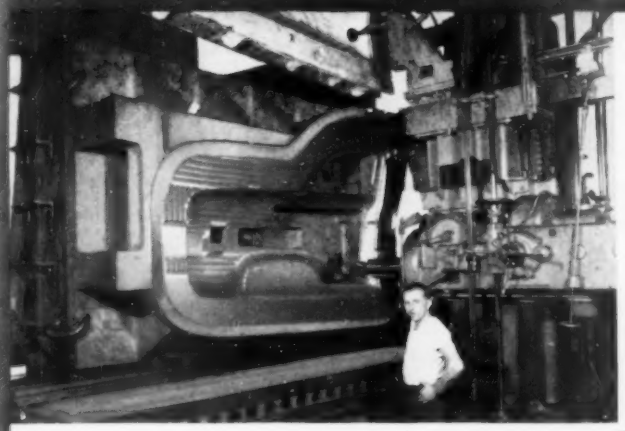
Bring your standard machines up-to-date with Turchan HYDRAULIC DUPLICATORS

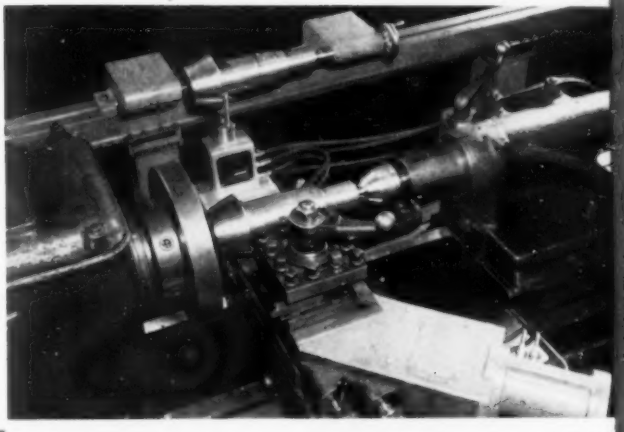


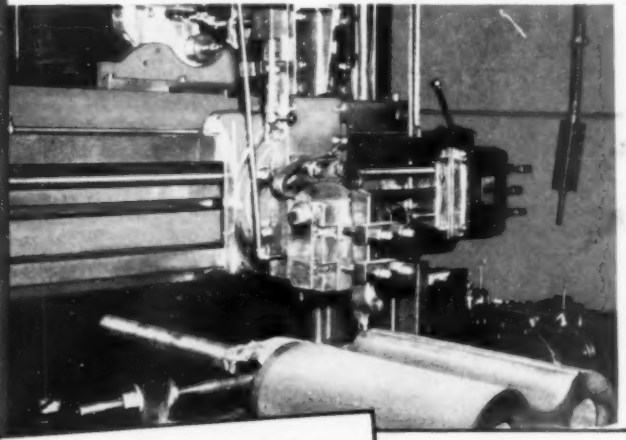
MILLING

The Turchan Follower attachment will transform those difficult tasks to simple push-button operation on your standard horizontal or vertical millers. Irregular profiles and contours; machining of dies, forms and moulds are achieved automatically. Hydraulically controlled cutting tools reproduce directly in metal, the exact dimensions of the model or template. No costly form tools or skilled help necessary. Close accuracies and extremely fine surface finish are cost-cutting features that save rejects. Turchan users report savings of 80% to 600% over old methods.

TURNING

Thousands of lathes in shops all over America, are increasing efficiency and speeding production with Turchan duplicators. The single attachment is pictured machining a stepped shaft. The Turchan replaces the regular cross slide; operates at 45° angle, taking uninterrupted cuts over the work. Square or tapered shoulders, radii, grooves, bevels and undercuts, as well as facing, are all taken in stride to accuracies of .001". There is also a Turchan *dual 45°* lathe attachment which actually doubles tool approach to the work. Any size or make of conventional lathe can be Turchan equipped.





PLANING

Standard planers equipped with the Turchan will duplicate irregular shapes, such as this blower section as readily as straight work. Contours are obtained automatically, with precision results. After job set-up, which is greatly simplified with the Turchan, little more than loading and unloading the work need be done. Once again skilled help is not required, yet production multiplies rapidly. Turchan Followers are also available for ordinary shapers and grinders. The attachment in no way interferes with the conventional controls of the machine tool. "Turn to Turchan to cut cost."

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investigate surface broaching for difficult machine work

● Many types of work can be surface broached on Footburt machines at remarkable savings over previous machining methods. High production is obtained with required accuracy and finish. Holding fixtures are designed for quick, convenient loading. Cutting tool maintenance costs are low. We will be glad to work with you on the application of surface broaching.

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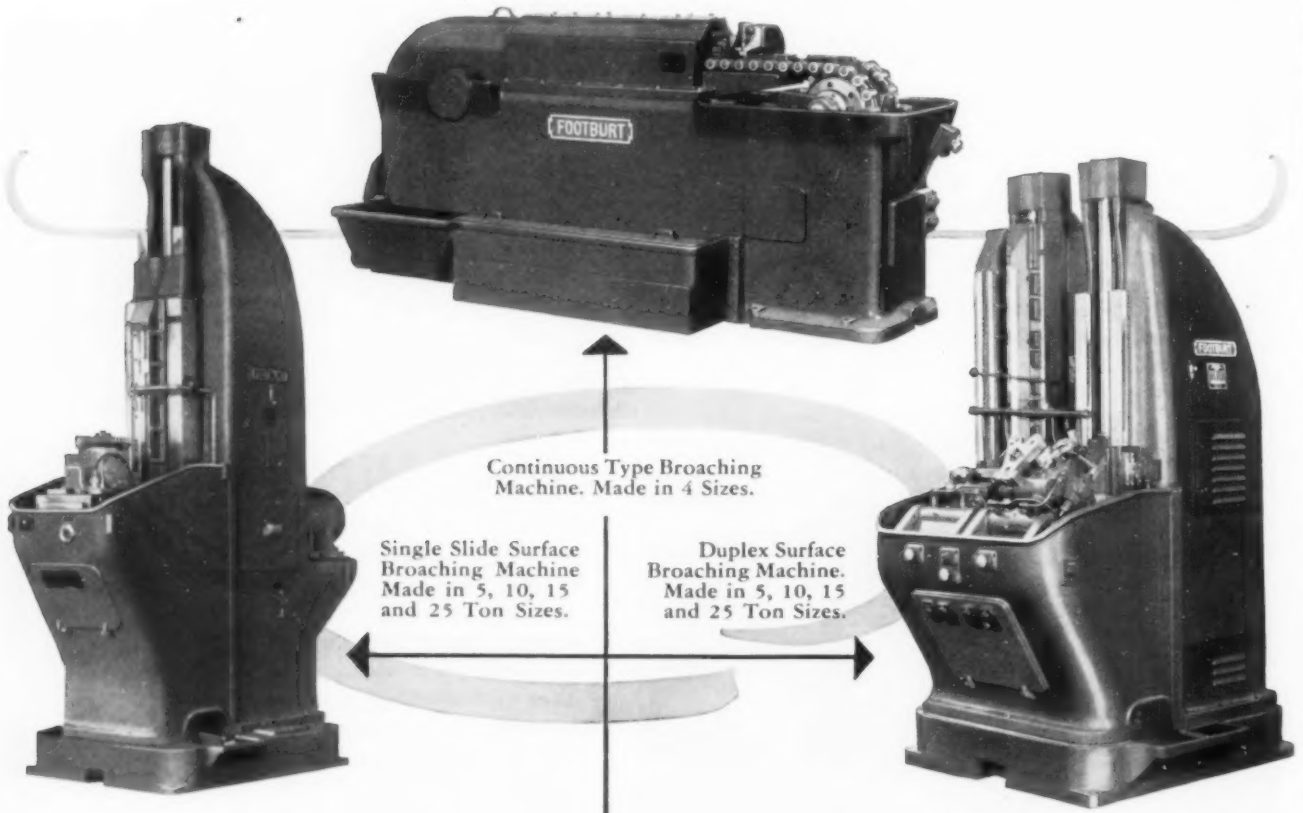
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Continuous Type Broaching Machine. Made in 4 Sizes.
Single Slide Surface Broaching Machine Made in 5, 10, 15 and 25 Ton Sizes.
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FOOTBURT

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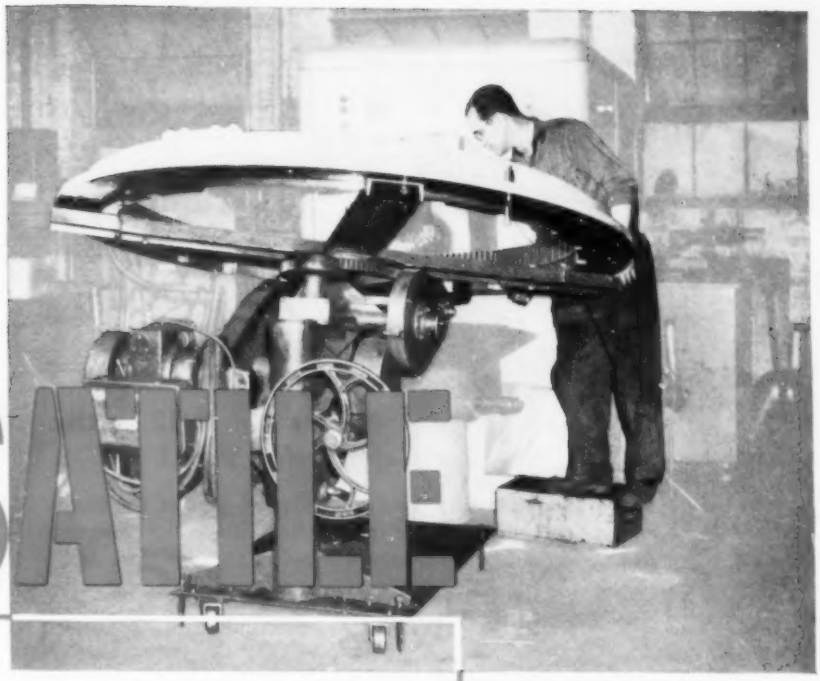
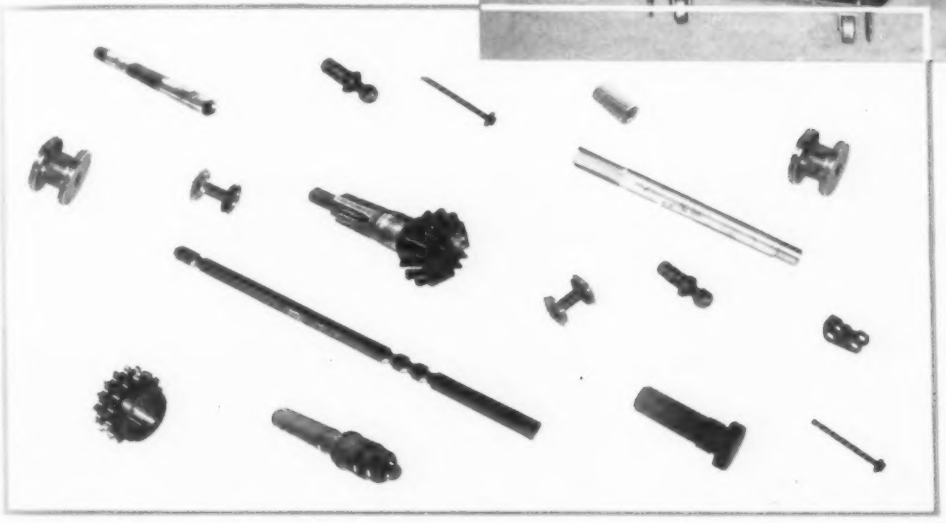


"Internal ring gear being hardened on the Lindberg LI-25 Induction Heating Unit".



Investigate the amazing versatility of the Lindberg Induction Heating Unit—approximately 2000 different parts have been selectively hardened or annealed on this typical commercial heat treating installation.

FROM THE LARGEST—The internal ring gear illustrated above—with a 60" inside diameter, 3½" face with 187 teeth each individually heated and oil spray quenched.

TO THE SMALLEST—This small 2" stamped metal rocker arm was selectively heated and water quenched on the small square face at the rate of 3000 per hour. Investigate this versatile Lindberg Induction Heating Unit—it may supply the answer to your selective heating operations.

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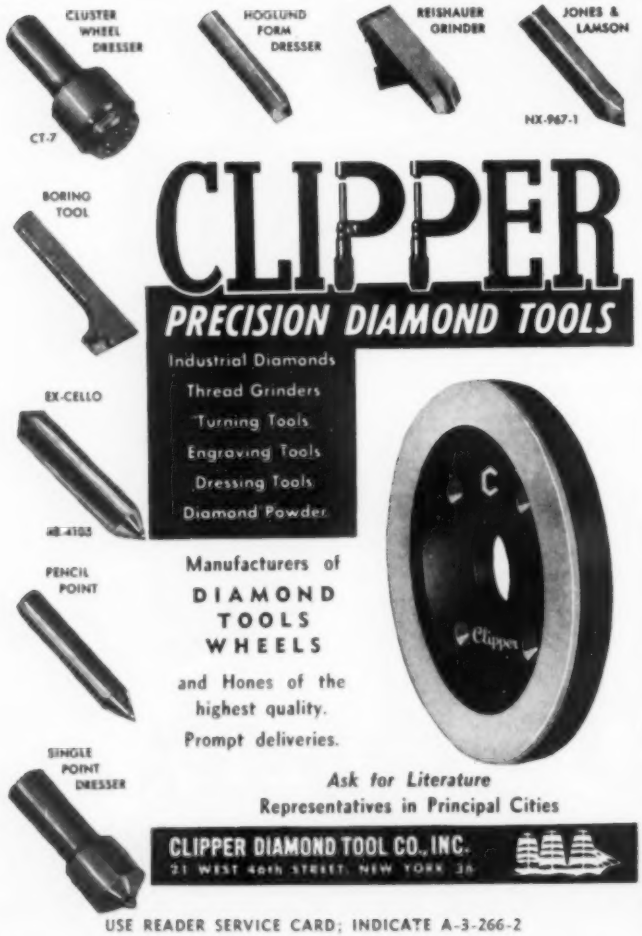

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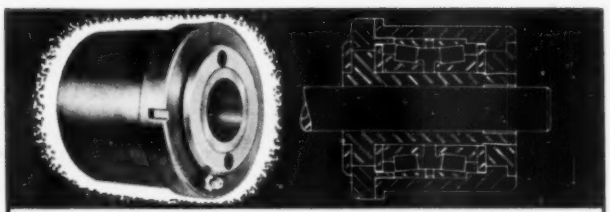

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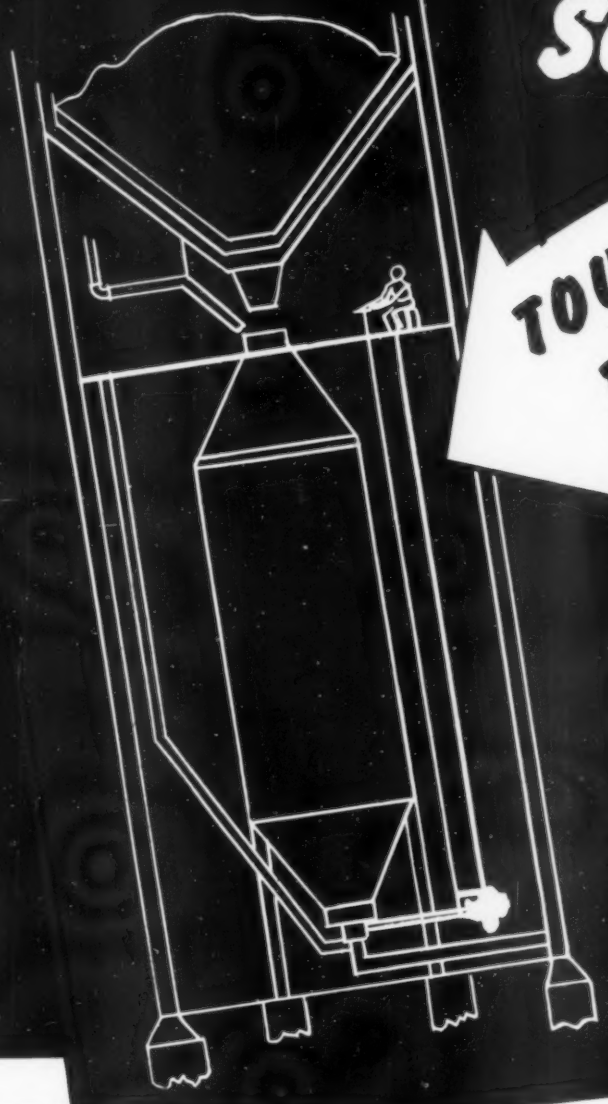

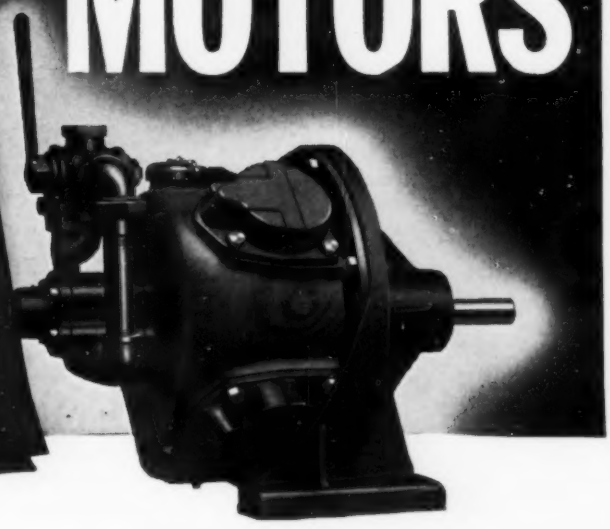

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Write, wire, or phone your nearest Ingersoll-Rand branch office for help with your tough control and drive problems . . . or request the new Air Motor Bulletin, Form 5072, which gives full information on over 110 sizes of Air Motors . . . both Piston and Multi-Vane types . . . speeds from 5400 to 19 r.p.m. . . . from 1 to 24 H.P. . . . or request information on fractional horsepower Air Motors.

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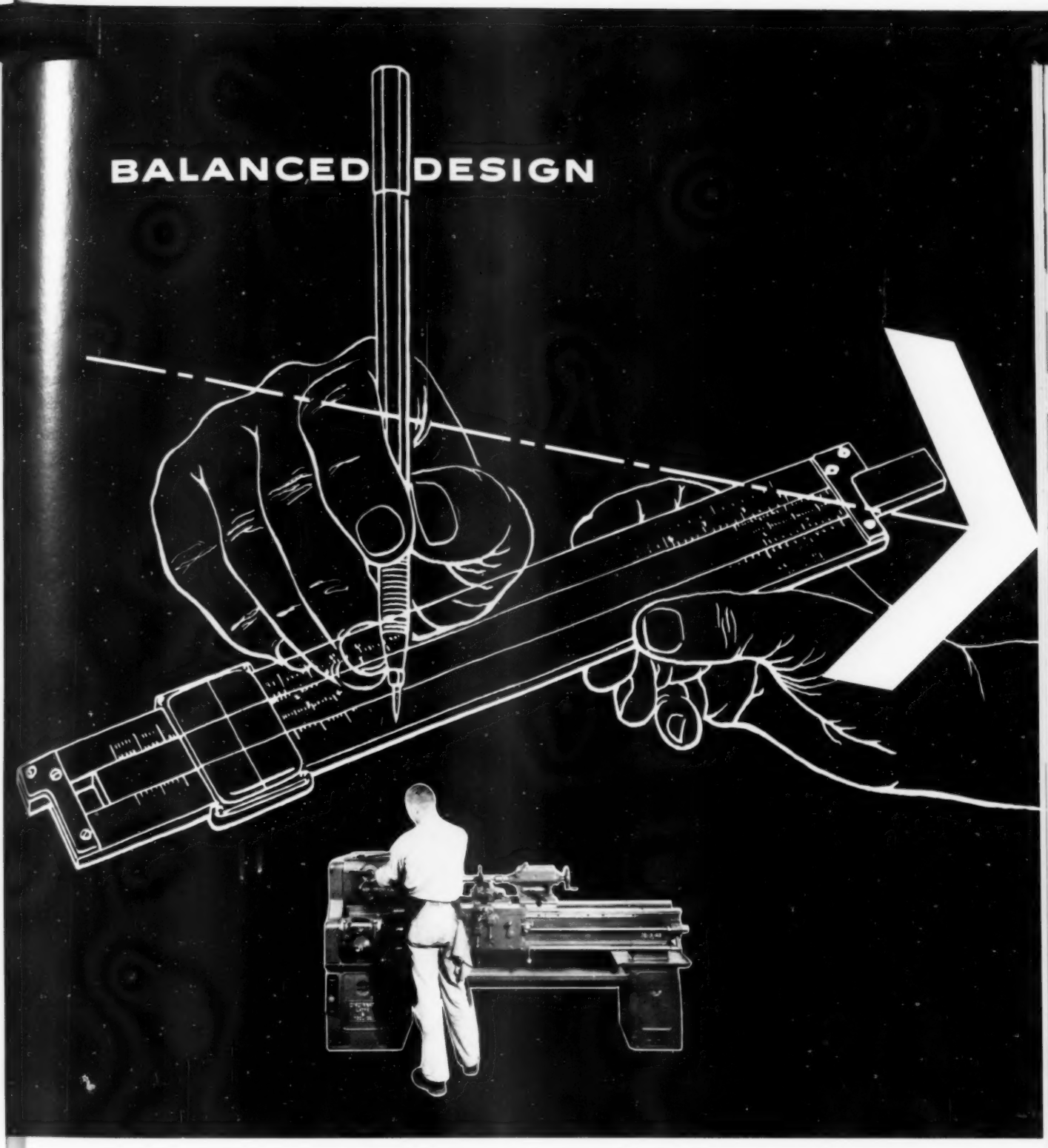

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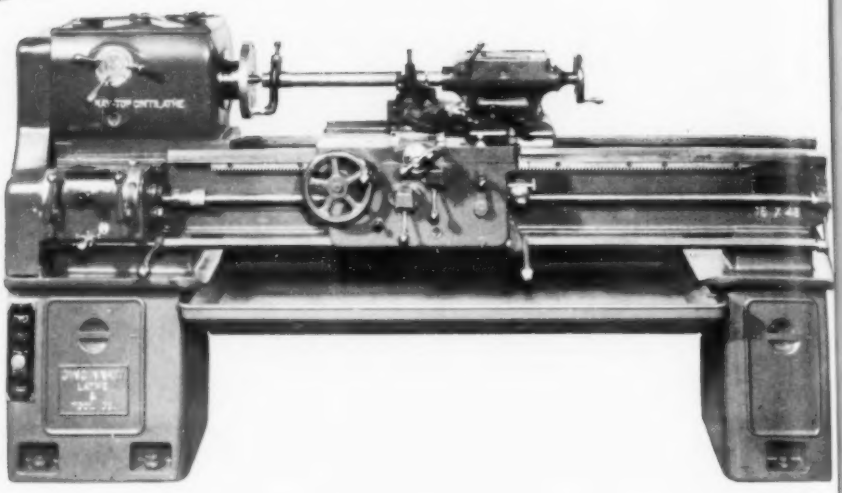

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12 spindle speeds in geometric progression with an all geared transmission . . . Large spindle mounted in three precision anti-friction bearings . . . Direct-reading color-match speed shift . . . Double walled, one piece apron with automatic lubrication . . . Totally enclosed, automatically lubricated, quick-change gear box, incorporating leadscrew reverse . . . Flame hardened gears in headstock, quick change box, and apron . . . Ground bedways (flame hardened at extra cost).

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Tray-Top for light duty (engine, toolroom and gap bed models);
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- Die shoes and punch holders precision bored on master-plates.
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- Absolute interchangeability between die shoes and punch holders.
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Sizes 1/16"—3/32"—1/8"—5/32"—3/16"

FITS ALL 1/4" CHUCKS

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Excellent Materials
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PARTIAL SPECIFICATIONS

Table working surface	12" x 51"
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Cross power feed	10¾"
Vertical power feed	16¾"
Spindle speeds (18)	33-1500 RPM
Motor	6½ HP

Built-in Attachment-Power-Feed and Rapid Traverse drive-mechanism.

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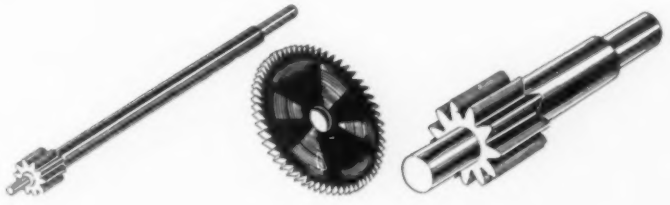

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He's a cute little fellow . . . all plastic except the feather wings. Both the male and female sections of molds used in producing all nine of MR. HOO-ZIT'S components pictured, were hobbed at Metalmasters . . . with resultant substantial economies in finishing and assembling.

Courtesy
Northwestern Prod. Co.
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Here's a fine example of a delicate HOBBING job . . . and many HOBS and CAVITIES requiring extraordinary skill and know-how are in everyday production here at Metalmasters. We have both the facilities and staff of experts with which to solve your every HOBBING problem . . . no matter how intricate. Be sure to consult us on your next job!

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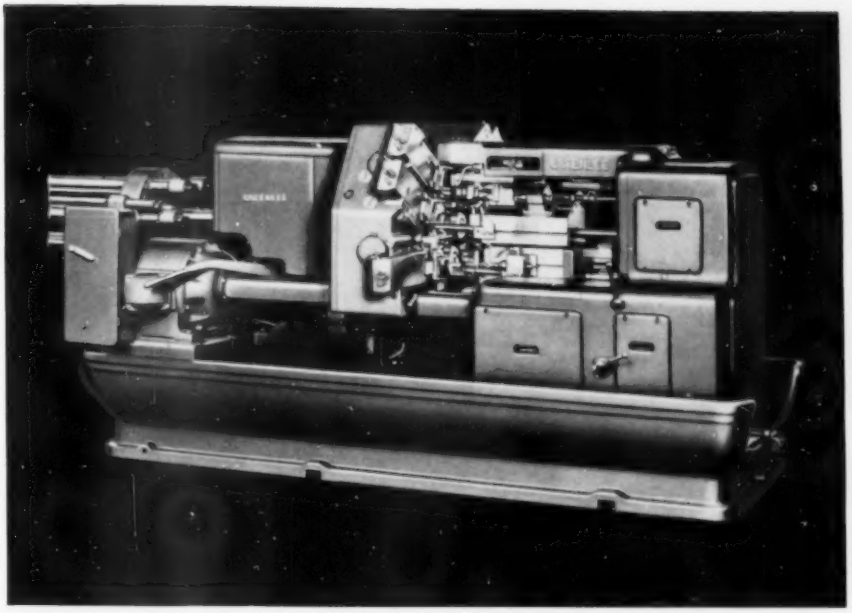


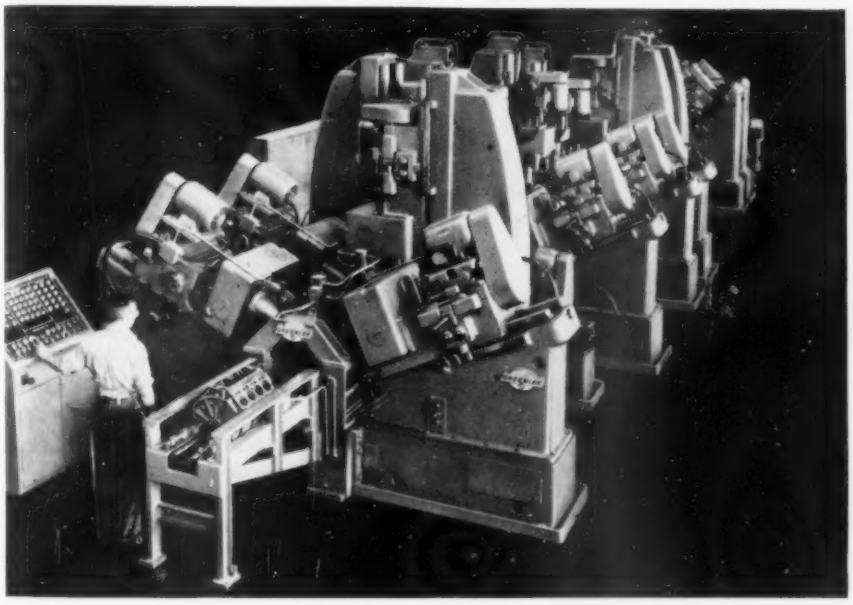
Greenlee Machines feature maximum economy of operation on short-run as well as long-run jobs . . . because of quick change-over, wide-open tooling area, great versality, low tool cost, and a wide variety of accessories.

The Greenlee "Six" is available in 1", 1-5/8", and 2" capacity — the "Four" in 1-5/8" and 2-5/8" capacity. This range covers the majority of all machine-shop needs.

Automatic Screw Machines

GREENLEE

Special Machine Tools



The first Greenlee "special" machine was designed and built in 1918, and Greenlee was also a pioneer in the development of automatic transfer machines now widely used in the mass-production industries. Greenlee machines are made up of *proved* units and mechanisms, specially combined to perform specific work . . . consequently, they show remarkably good performance right from the start of their operation.

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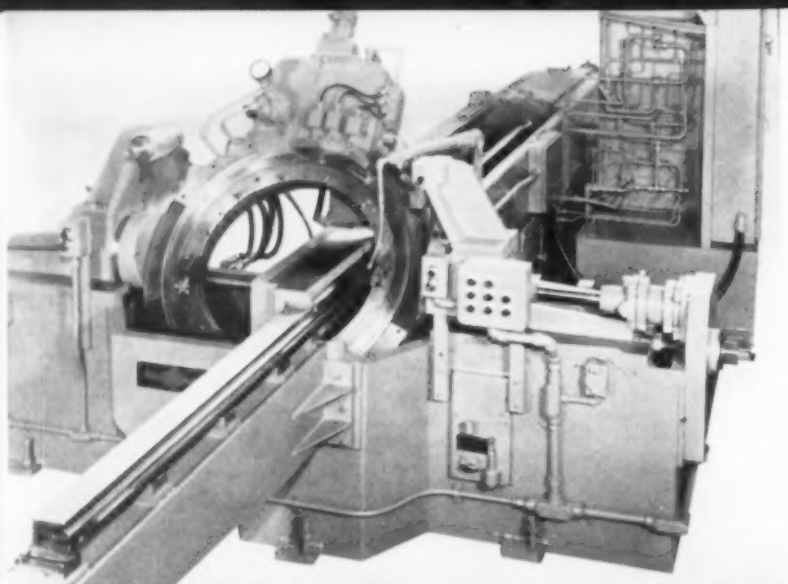
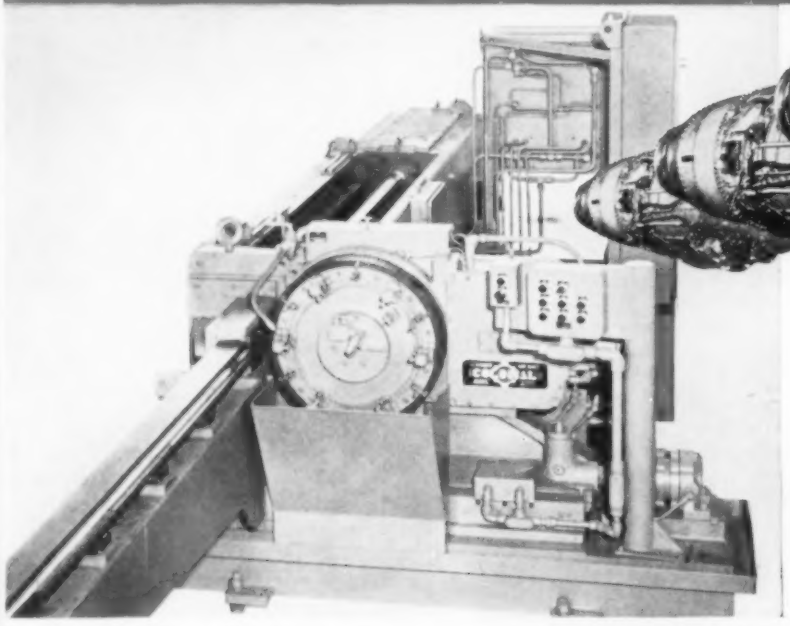
GREENLEE

MULTIPLE-SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES

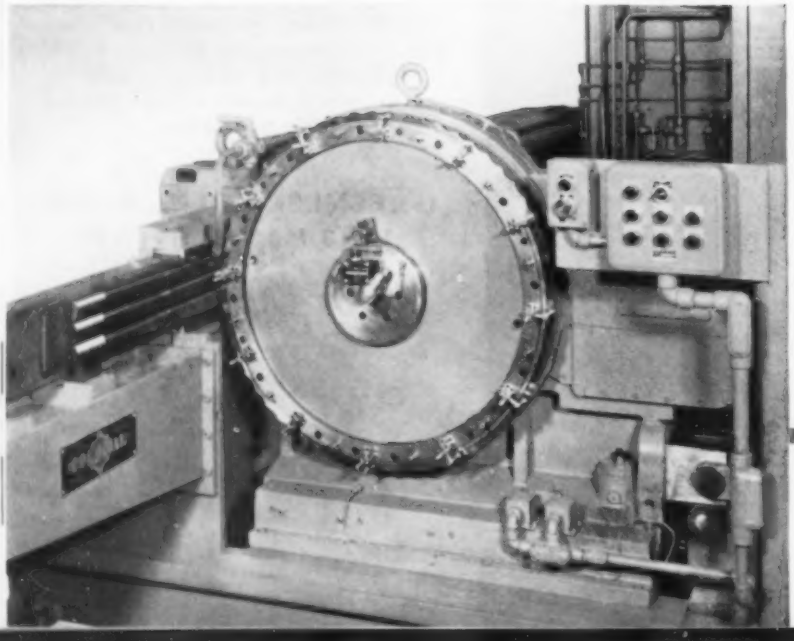


COLONIAL broaching machine, 10-ton 90-inch stroke horizontal, with trunnion fixture for angular adjustment. Shuttling, indexing, ram operation, and rapid return fully automatic, for broaching internal slots on Curtiss-Wright SAPPHIRE ring segments. Pneumatic part ejection manual control.

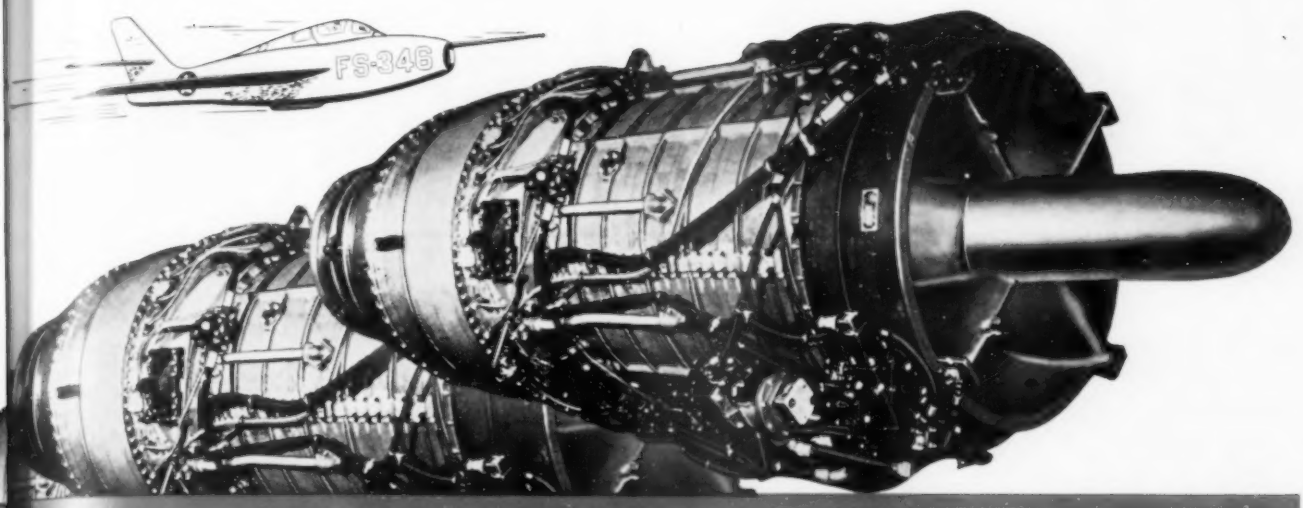
COLONIALS *in the Shop* MEAN M



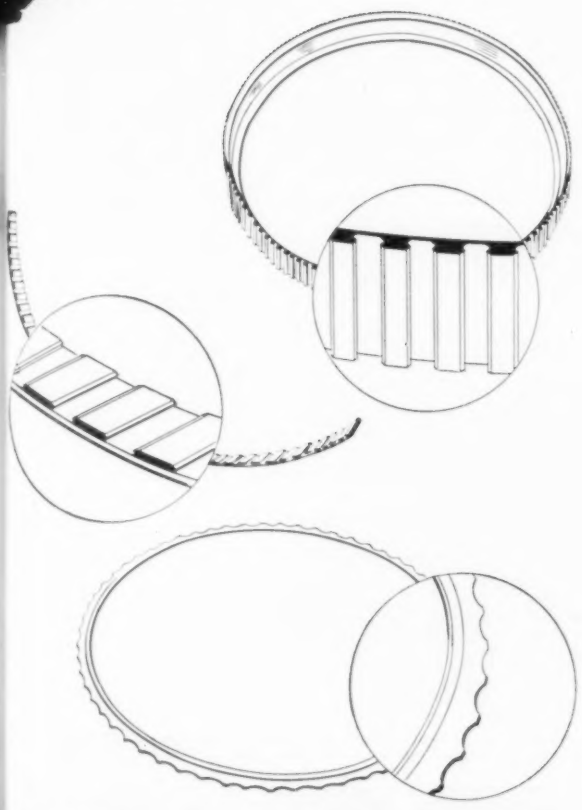
Another fully automatic COLONIAL 10-ton 90-inch stroke horizontal broaching machine broaches external slots on a SAPPHIRE jet engine part. Again, shuttling, indexing and ram operation are automatic, and part ejection is pneumatic manual control.



Three external scallops on this Curtiss-Wright SAPPHIRE part are broached automatically with each stroke of the ram, on this 10-ton 60-inch stroke COLONIAL broaching machine. Like the other machines shown, electrical controls permit individual operation of each function for set-up and tryout purposes.



CURTISS-WRIGHT MORE SAPPHIRES *in the Air*



These drawings, distorted for security reasons, indicate the types of jet engine parts being produced automatically today on COLONIAL broaching machines with 'unified' broaching.

COLONIAL BROACH is proud to be a supplier of broaching machines to the Curtiss-Wright Sapphire jet engine program. This 25% more powerful jet fighter engine has gone into production in record breaking time, and record breaking production will be possible due to the high production accuracy of machine tools like the fleet of automatic Colonial broaching machines, complete with Colonial broaches and fixtures, working on this program.

"Always ready for flight" is the reputation established by SAPPHIRES at the Air Force's principal flight test base. "Always ready for broaching" is the reputation established by COLONIALS in leading production shops of America. This reputation can be traced to Colonial's 'unified' broaching, made possible by designing and producing the broaching machine, the broaches, the fixtures, and the automation, all in Colonial's own plant, and all serviced by Colonial in the production shop.

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COLONIAL

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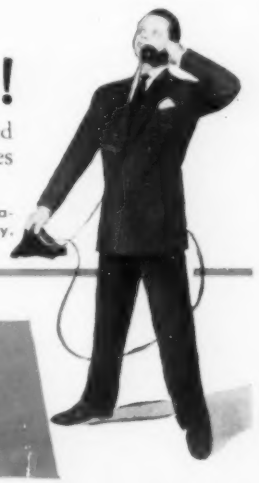
Call your CARBORUNDUM *Salesman or Distributor* today!

He's your best bet for complete stocks, prompt delivery...and best of all, experienced counsel on *every* new development in the *entire* field of abrasives. He's in the yellow pages under "Abrasives" or "Grinding Wheels." Phone him today—it's to your profit!

Ready now—your free copy of the new big COATED ABRASIVE SELECTOR catalog...containing detailed recommendations for both machine and hand sanding operations on tough and soft metals, glass, plastic, wood. Phone for it today.



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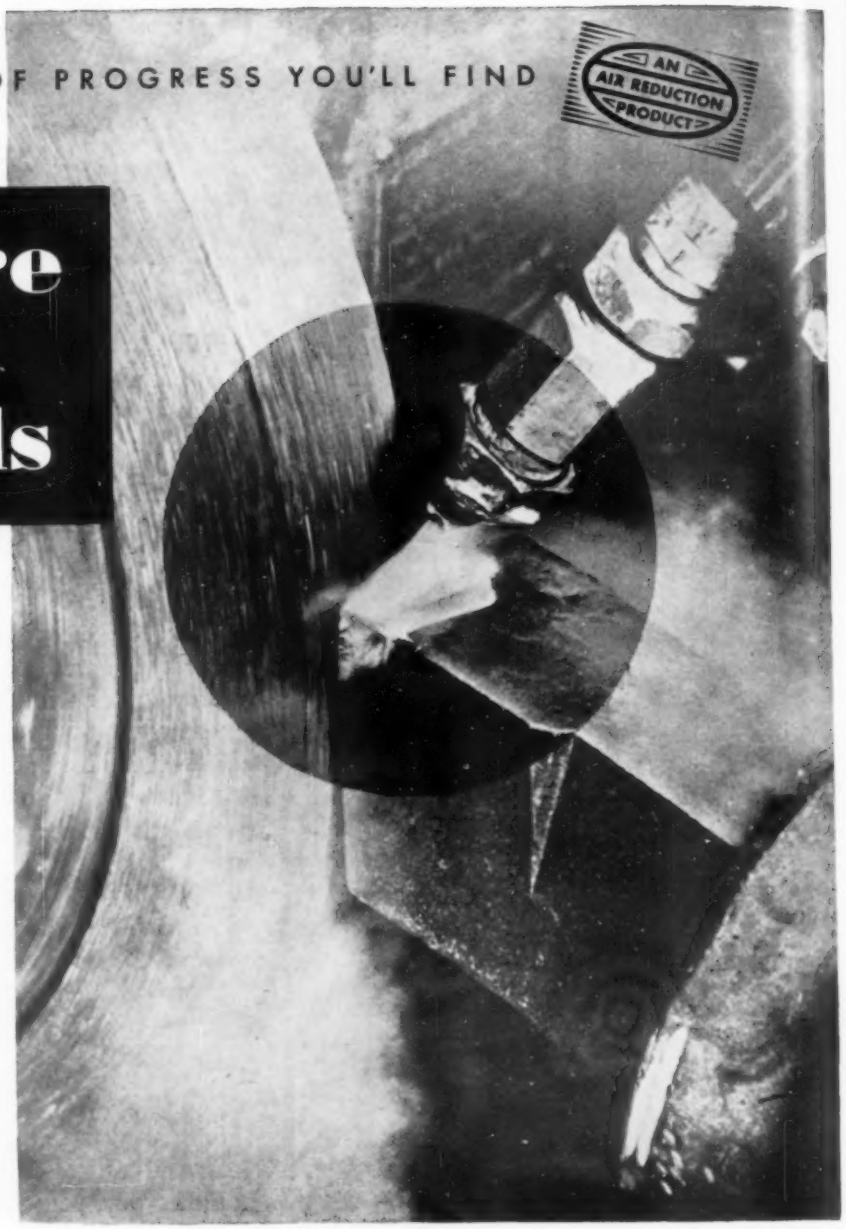
Cold Cure for Hot Tools



CO_2 . . . coolant for carbide tool grinding

"Don't touch it till it cools off!" That's the cry you heard wherever carbide tools were being ground. For a good reason, too — because handling a newly ground tool was like touching a hot coal. CO_2 has changed all that. Released directly where carbide tool and grinding wheel meet, liquid CO_2 turns into carbon dioxide snow, instantly absorbing the heat of abrasion.

When CO_2 is used as a coolant, automatic advantages follow. These include:

Better Tool Life . . . heat cracking and checking of carbide is eliminated.

Longer Wheel Life . . . tests showed that only one wheel dressing was required when CO_2 was used—for every 11 dressings when conventional cooling methods were employed.

Faster Grinding . . . where it previously took 45 minutes to re-grind a single tool, CO_2 cuts this to 15 minutes of steady, heatless grinding.

Cleaner Conditions . . . no problems with rust, bacteria or disposal.

Positive Control . . . pin-pointing of CO_2 flow to grinding zone permits close control of heat removal.

Send for the booklet "Carbon Dioxide as a Machine Tool Coolant". After reading it, you may wish to see a demonstration of CO_2 coolant in your own plant. If so, write and let us know.

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Drill Hardened Steels without Annealing –

With the new, improved "HARDSTEEL" Drill, you can do accurate, smooth drilling, countersinking, counterboring and reaming in steels hardened by any process without first annealing the work. And they work with equal ease on work-hardening steels and high carbon–high chrome steels of any degree of hardness.

"HARDSTEEL" Drills fit standard drill presses. They save time and reduce rejects. They permit engineering changes requiring additional drilling after hardening. And parts drilled after hardening always match at assembly.

Write for a copy of the "HARDSTEEL" Operators Manual showing how "HARDSTEEL" drills are cutting costs in thousands of plants.

You Harden It—We'll Drill It—
With "HARDSTEEL"

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BLACK DRILLING UNITS—AUTOMATIC, SELF-CONTAINED—FOR COST-CUTTING PRODUCTION ON ALL MATERIALS
Write for information

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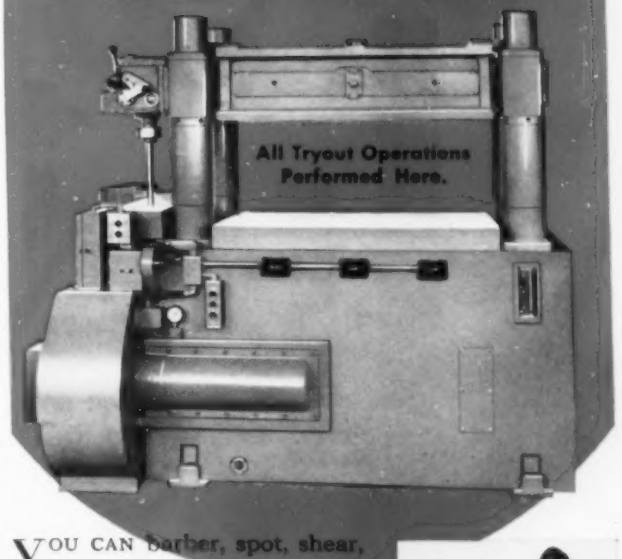
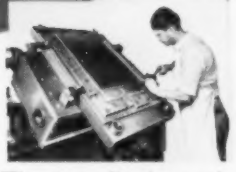
NEW ALPHA 100 TON DIE TRYOUT PRESS

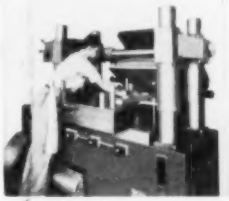
Saves Skilled Labor Hours



YOU CAN barber, spot, shear, fit and finish both die and punch WITHOUT REMOVING the DIE. "Tryouts" take less time because the press is open on all four sides, giving easy access to the die and punch. The head can be quickly released and rotated to any point up to 240°. This new press is compact, being 82" high and occupying only 75" x 84" of floor space. The rugged construction of the Alpha 100-ton die tryout press assures years of trouble-free service.



The top die in position for altering.



It's easy to work on the bottom die.

Send today for your free folder. It gives all the details about this remarkable press.

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Reverse brake band anchor forging

Finished work part

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the Key to Broaching Speed and Economy

Because the fixtures so often determine the speed and economy of broaching operations, it is just "good business" to entrust their design to specialists of proven experience and ability in the broaching field. Manufacturers, high production and job lot, depend on Red Ring broach engineers to develop their tooling.

Illustrated here are some of the fixtures used to produce the reverse brake band anchor, an element of a modern automotive torque converter. Of the 7 machining operations on this part, 5 are broaching.

Ask Red Ring broach engineers for suggestions on your tooling.

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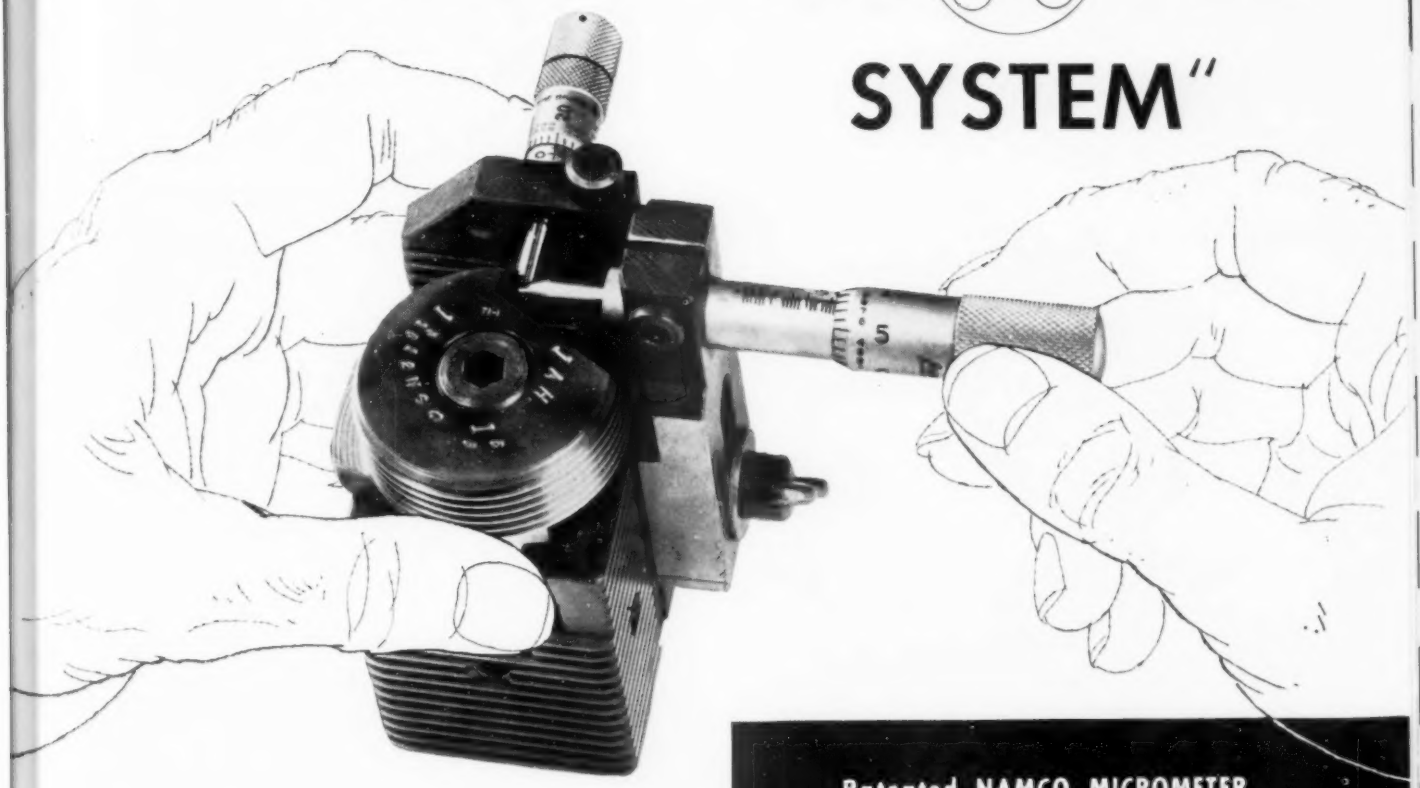
another reason why owners say —

"We use the VERS-O-TOOL SYSTEM"



They call it a "system" because, among other exclusive features, Vers-o-tools are provided with a patented Namco Micrometer that takes the guess-work out of chaser grinding.

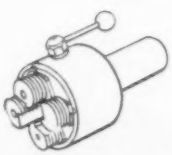
No trial cuts, no adjustments, no time or scrap loss. And by providing an extra set of chasers, kept ground in the toolroom and ready, you put long run jobs on a continuous production basis. Time saved by using this gage frequently adds thousands of precision threads—reduces your costs.

Other Advantages of the System

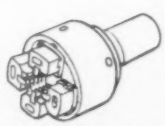
Standard Vers-o-tools use either the famous ground thread circular chasers or the lower cost, adjustable-blade, ground thread chasers—interchangeable die size for die size, in both revolving and non-revolving self-opening heads. The same system applies for end forming and end turning cutters. Use of knurls and rolls is common practice.

Once you start using Vers-o-tools, you are immediately equipped for a more versatile use of threading equipment, at a lower tool investment, than is possible from any other source.

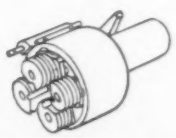
Ask for DT-52, complete new catalog on Vers-o-tool and Namco Solid and Collapsible Taps.



Style DS Vers-o-tool (Non-revolving Type) 10 Sizes, 3/8"—6 1/2".



Style DR Vers-o-tool (Revolving Type) 13 Sizes 3/16"—6 1/2" Shown with Adjustable Blade Chasers 7 Sizes, 3/8"—2".



Style DBS Vers-o-tool (for B&S Automatics) 3 Sizes, 1/4"—5/8".

Patented NAMCO MICROMETER takes the guess-work out of chaser grinding

THIS IS THE WAY IT WORKS:

- ★ Remove chasers from Vers-o-tool head (in one minute) and take a micrometer reading.
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- ★ Replace chasers in head (one minute) with *certainty* that they will cut threads *identical* to those cut on previous grinds.

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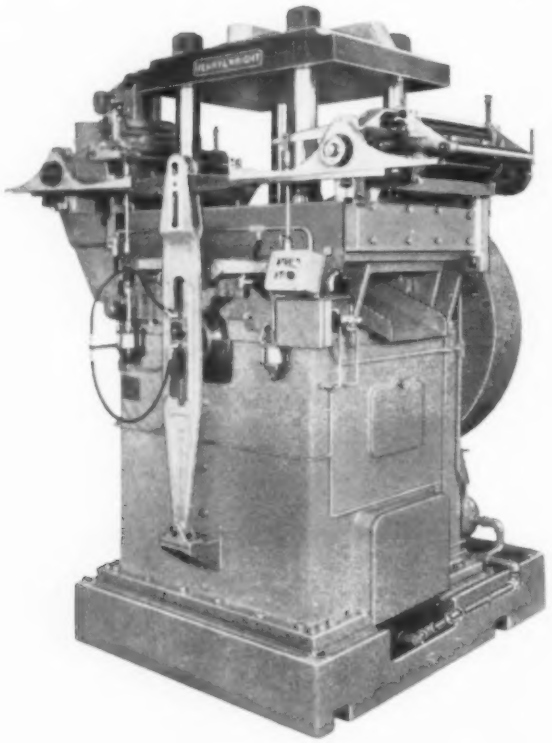

Our customers say that. It figures. One Dieing Machine does the work of five to ten conventional stamping presses. One stroke—a complete part. One inspection. One trip for parts removal. Speed—you can pull out the throttle. Die life—longer for two reasons. (1) Stability, minimum vibration, extreme precision of tools alignment. (2) Dies take less of a beating; less metal needs to be removed for sharpening. Our men can give you the whole Dieing Machine story. If you want to cut costs, now's the time to talk to one of them—a note from you will have an H & W man on deck promptly.

NEW CATALOG Up-to-the-minute facts on Dieing Machines. Capacities now range from 25 tons to 2500 tons. Catalog gives specifications up to 400-ton machine. Write Henry & Wright, 421 Windsor St., Hartford, Connecticut.

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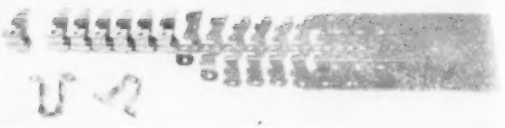
HARTFORD 1, CONNECTICUT

TYPICAL JOBS THAT SHOW A PROFIT AT EVERY STROKE



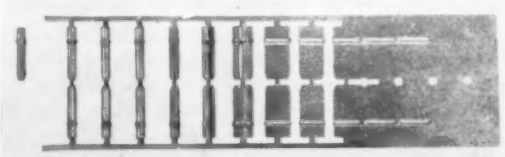
Automotive stamping produced complete per stroke from $\frac{3}{32}$" thick by 13" wide hot rolled steel in coils on 200-ton Dieing Machine, single gear type, equipped with progressive die. Speed approximately 45 strokes per minute.

Ball bearing retainer produced complete in 75-ton Dieing Machine operating at speed of 95 strokes per minute. Made from $4\frac{3}{8}$" wide by .034" thick cold rolled steel.

Ferrule. One completed piece produced per stroke in 50-ton Dieing Machine operating at speed of 90 strokes per minute. Made from $\frac{9}{16}$" diameter by $\frac{7}{8}$" long by .030" thick cold rolled steel.

C-Clamp Frame. Both halves produced complete in 150-ton Dieing Machine operating at speed of 65 strokes per minute. Material—cold rolled steel .086" by $4\frac{5}{8}$" wide.

Support bracket produced complete one per stroke in 150-ton Dieing Machine operating at speed of 60 strokes per minute. Made from .062" thick by $7\frac{1}{4}$" wide cold rolled steel.



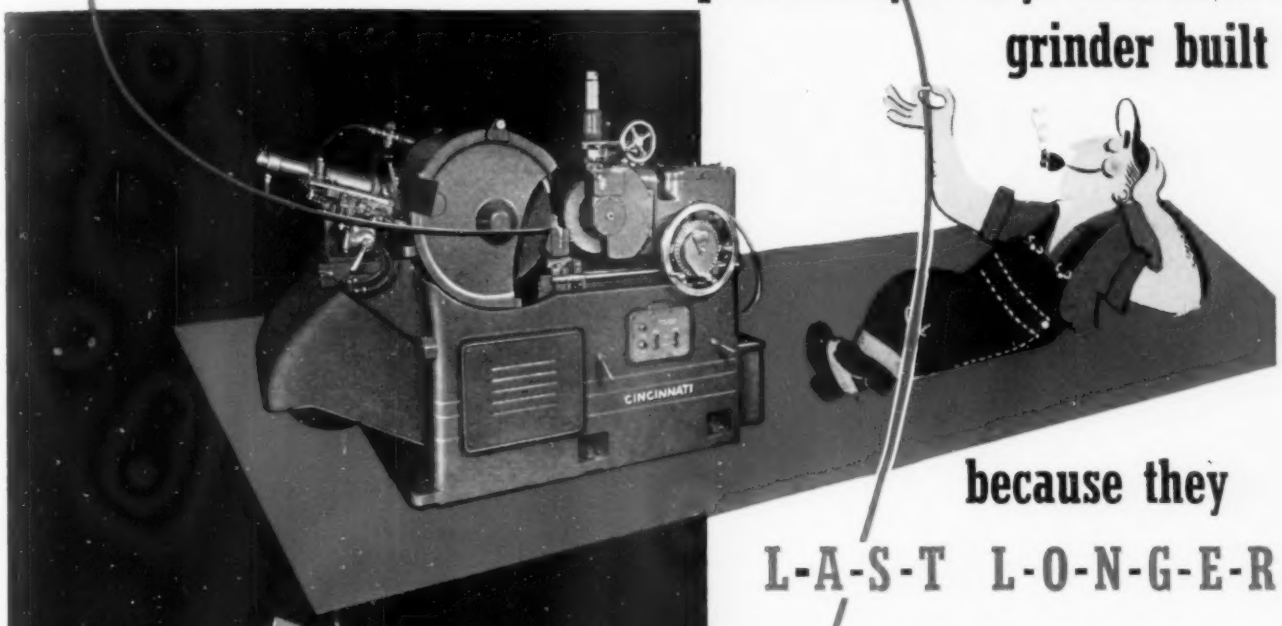
Radio tube prong produced complete in 25-ton Dieing Machine at rate of 450 pieces per minute. Made from brass .012" by $1\frac{7}{16}$" wide.

Bathroom fixture produced in 60-ton Dieing Machine operating at speed of 100 strokes per minute. Made from .032" thick by $1\frac{3}{4}$" wide cold rolled steel.

Hardware item. One completed piece produced per stroke in 100-ton Dieing Machine operating at speed of 75 strokes per minute. Made from 3" wide by .040" thick cold rolled steel.

OK CENTERLESS BLADES

. . . standard equipment on practically every centerless grinder built



because they

L-A-S-T L-O-N-G-E-R

The phenomenal long life of Ohio Centerless Work Blades and Guides is due to their extreme hardness, high finish and close tolerances. Long blade life means high production resulting in lower costs.

Made of tungsten carbide, high speed steel, cast alloys or iron. Non-metallic tips available upon request.

In addition to standard blades, special contours, angles or shapes are made to your blue prints.

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Hardened Spacers, Ways, Gibs, Ball Races, Slitter Knives, Shear Blades, Rotary Shear Knives, Bronze Ways, Wear Strips.

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Please send free Bulletins on OK Centerless Blades, etc.

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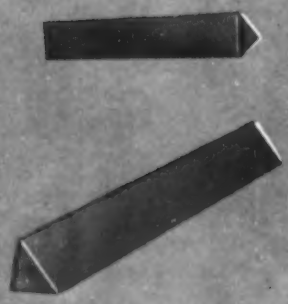
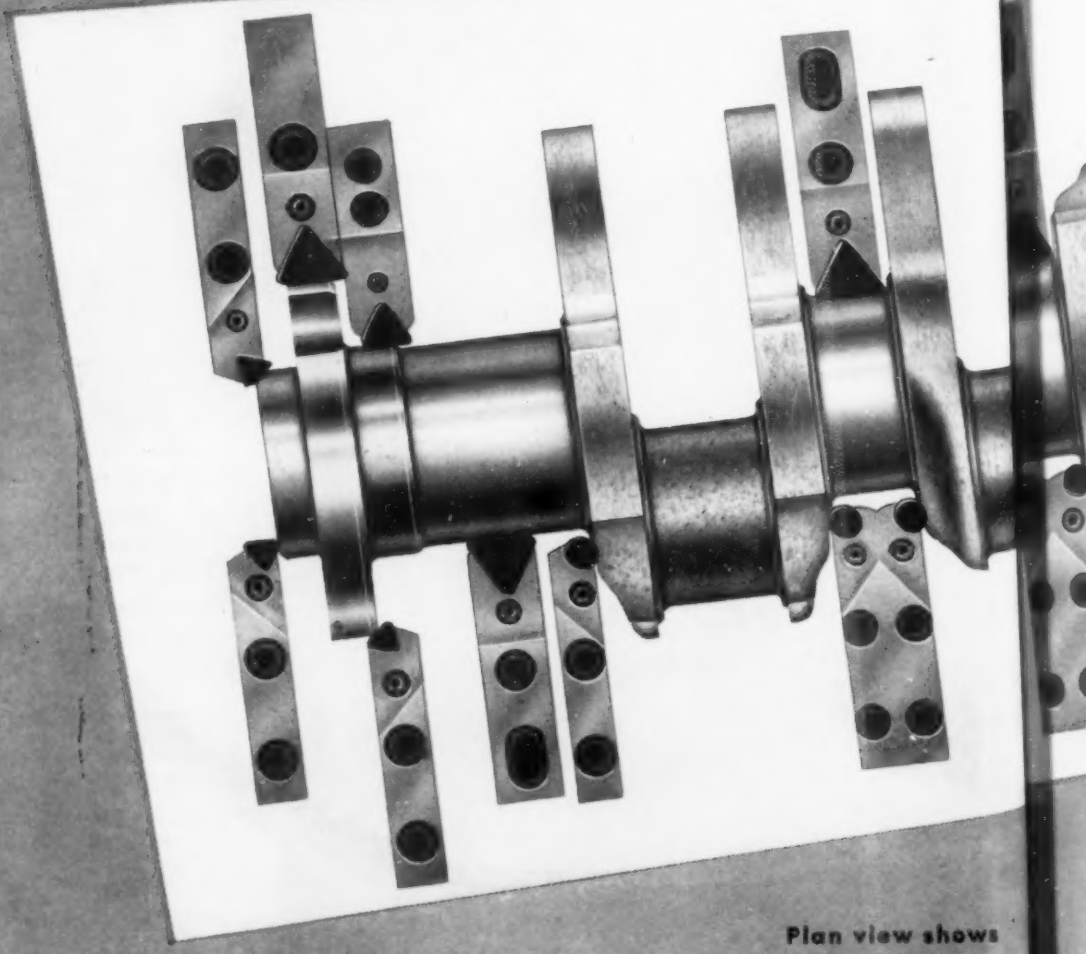
WESSONMETAL
TUNGSTEN-CARBIDE

WESSON TOOL HOLDERS

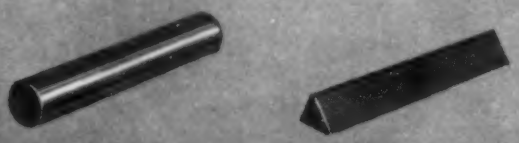
First.





Wessonmetal—the cemented carbide giving users phenomenal performance throughout industry—turns to new successes on this difficult crankshaft turning job. Look at the production increase, the increase in pieces per tool change, the long, more efficient tool life possible with Wessonmetal.

Plan view shows position of front and rear tools only.



WESSONMETAL

WESSON METAL CORPORATION
LEXINGTON 34, KENTUCKY

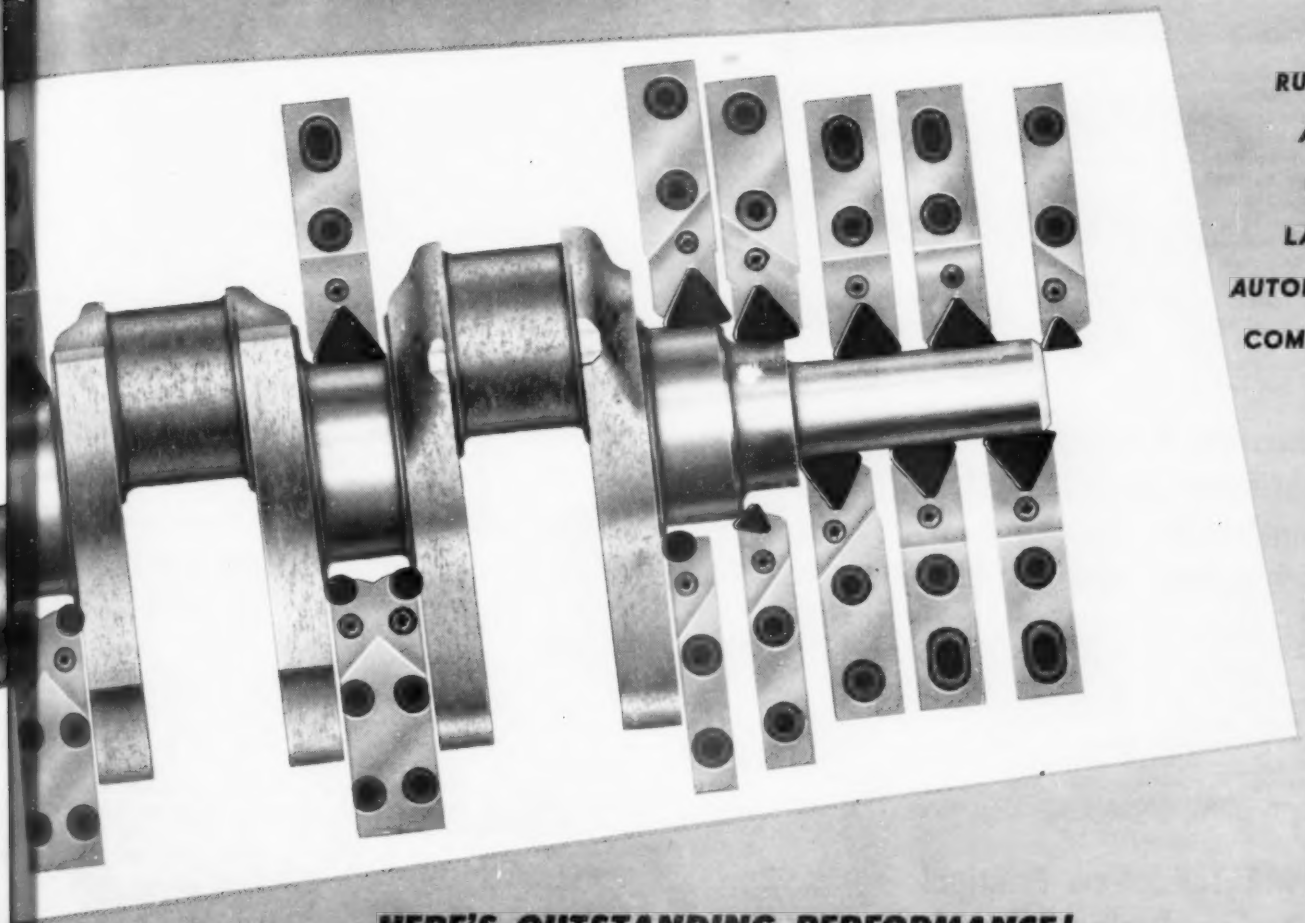
TO TURN CRANKSHAFTS

with CARBIDE INSERT TYPE TOOLS

USING WESSON BAND TYPE TOOL HOLDERS

and WESSONMETAL SOLID CARBIDE INSERTS

ON LeBLOND AND WICKES LATHES



NOW RUNNING AT ONE OF THE LARGEST AUTOMOTIVE COMPANIES

HERE'S OUTSTANDING PERFORMANCE!

AN AVERAGE OF 9000 PIECES PER INSERT BEFORE SHARPENING

OLD METHOD	
Pieces	11 per hour
Cycle Time	1 min. 55 seconds
Cranks per tool change (average)	1.7 pieces

NEW WESSON METHOD	
Pieces	48 pieces per hour
Cycle Time	40 seconds
Cranks per tool change (average)	1500 pieces

WRITE FOR *Complete Story* with DRAWINGS

WESSON COMPANY

1220 WOODWARD HEIGHTS BLVD. • FERNDALE (DETROIT 20), MICH.

How to Produce and Measure

Precision Flatness and Finish...

On Metals, Ceramics Quartz and Plastics

Many industrial laboratories are using the Lapmaster in experiments with flatness and finish. In some cases experimental work is carried on in the laboratory and, as a result of the consistency of this machine in producing precision flatness, larger Lapmasters are put into production in the manufacturing line. One such manufacturer of steering gear assemblies saved considerable time over hand lapping of washers and worms. Schools and manufacturers engaged in restricted defense work are finding and utilizing advantages of the old operation of lapping when produced by modern Lapmasters. If you are interested in precision flatness and finish, it will pay you to investigate the Lapmaster. For instance:

Consistent Flatness of 1 Light Band (.0000116") Opens Countless Possibilities For Product Improvement

Manufacturers of pumps, compressors, and equipment containing liquids or air under high pressures have found it possible to eliminate gaskets in mating surfaces because of the extreme accuracy of work produced by the Lapmaster. Quality of surface (RMS) is controlled by Lapmaster compounds. Micro-inch finishes of 2 to 3 RMS are common. Surface flatness can also be held to less than one light band or .0000116". (11.6 millionths of an inch.)

LAPMASTER'S New Principal in Machine Design Offers Cost Reduction *Plus* Consistent Accuracy

Lapmasters are extremely versatile lapping machines. Precision flatness and super finish can be generated in both small and large production quantities. In one cycle, Lapmasters can precision-lap either identical parts or parts of dissimilar shapes and materials.

LAPMASTER Monochromatic Lights and Optical Flats

Here's the equipment you'll need for checking accurate lapping.

The Monochromatic Light is a sturdy, completely self-contained and portable precision instrument that can handle any size part. Reversible light head permits checking normal size pieces on the stage, larger parts on a table. Light is of high power to show visible bands on relatively long polished surfaces and materials difficult to check. Power supply is a 5000 volt transformer operating on 110-120 V., 60 cycle current.

Lapmaster Optical Flats offer the most accurate standard of measurement available. They are made of highly transparent quartz which holds its shape indefinitely, is abrasion resistant and resists thermal shock. Flats are available to a standard of either 1/10 or 1/5 of a light band across their diameter.

Additional Data

Full facts on Lapmaster production lapping — Flatness interpretations available in two illustrated booklets. They are yours for the asking.

Crane Packing Company, Dept. TE-3, 1823 Belle Plains Avenue, Chicago 13, Illinois

JOHN CRANE

CRANE PACKING COMPANY

BLENDING IN A WELDED CORNER is a job you can do faster and better with a Norton BFR semi-flexible wheel.

CLEANING OUT FINS of a compressor casting is a hard job made easy — when you use a Norton BD rigid hub wheel.

NEW!... The Norton BF Wheel For Light Finishing

Meet the latest Norton development for your lighter finishing jobs. Basically, the new BF wheel is built like the BFR wheel but is designed especially for periphery grinding. You'll find its flexibility in the softer grades (G and I) ideal for blending and smoothing curved surfaces and corners. The hardest grade (K) is more rigid — best for light welds and sharp edge applications. In all grades it tends to finish as it cuts.

Like the BFR and BD wheels, the new BF wheel cuts fast and free and has a high safety factor. Like them, too, it features versatility, covering a range of usefulness that includes finishing stainless steel welds, deburring metal parts such as stampings and removing gates and fins from molded plastics. Let the new BF wheel add "The Touch of Gold" to many of your own light-duty grinding jobs.

Smoothing welds in a fabricated cone — semi-flexible BFR

Notching risers on gray iron castings — either type

Here's your "TOUCH OF GOLD" team for more economical portable grinding

You get the real cost-cutting, value-adding "Touch of Gold", in job after job, with these Norton Reinforced Hub Wheels.

They're the long popular Norton BD rigid and the newer Norton BFR semi-flexible — the most useful pair of hub wheels ever built. They're lighter and easier to handle than cup wheels, longer lasting than coated abrasive discs, and more versatile than either.

Faster, Safer. Made of aluminum oxide and silicon carbide abrasives, resinoid bonded, both the BFR and BD cut fast and cool. And for tops in safety they're reinforced with Nylon webbing. Even should breakage occur, this strong web keeps pieces from flying off until the machine can be stopped.

Wide Job Range. Where finish is most important, use the semi-flexible BFR wheel. Where stock removal is the main factor, you'll prefer the heavier duty, rigid BD wheel. Together, they make a grinding team that will help you turn out better products easier and faster — adding the profit-boosting "Touch of Gold" to countless every-day grinding jobs.

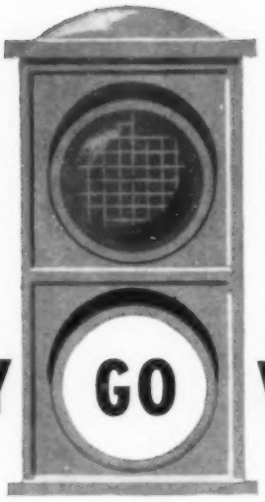
Get your Norton distributor to demonstrate

these versatile Norton wheels in your shop. He'll be glad to help you on any grinding problem and, if necessary, he'll call in a Norton Abrasive Engineer. Or write to NORTON COMPANY, Worcester 6, Mass. for a copy of descriptive folder #225. Distributors in all principal cities. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

NORTON
ABRASIVES
Making better products to make other products better

W-1472

One of the major factors contributing to long tool life and better stamping is the working alignment of tools. This fundamental principle was recognized in the first V & O press. For more than 60 years the V & O long slide design has been preferred when tooling is costly.

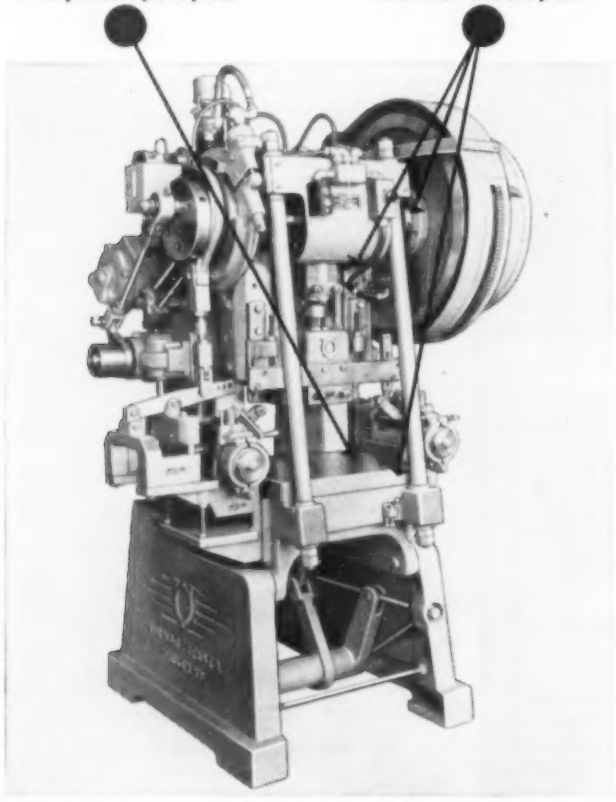


WHEN TOOLING IS COSTLY GO V&O

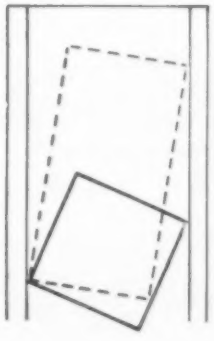
WORKING ALIGNMENT DEPENDS ON

WHAT YOU DO HERE
when you set up the press

AND WHAT WE DO HERE
when we make the press



More room to attach tools, controls, moving members, too



WHY THE V & O LONG SLIDE PROVIDES BETTER ALIGNMENT

With the same running clearance, the longer the slide, the less possibility for angular misalignment.

WORKING ALIGNMENT depends upon properly aligned tools *STAYING* aligned throughout the power stroke. Simple geometry will show that the long slides on V & O Presses minimize the possibilities of the tools being forced out of line. The superior workmanship and accuracy of V & O Presses supplement this long slide principle. This is especially important on long strokes. The longer the stroke the greater the superiority of the V & O long slide principle.

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THE V & O PRESS COMPANY
Division of Emhart Mfg. Co.

BUILDERS OF PRECISION POWER PRESSES AND FEEDS SINCE 1889

HUDSON NEW YORK

How a carbide die outperforms a steel die by 25 to 1 for Schick, Inc.

In past six years, a Carboloy die (shown at left) produced over 62,500,000 parts with only 25 regrinds. It saved 4,375 hours of steel-die regrinding time . . . saved 900 hours of press setup time because of longer production runs. Carbide die produces over 2,500,000 pieces per grind . . . steel die, less than 100,000.

Carboloy Cemented Carbide die built for Schick, Inc., in 1946 by Lincoln Park Industries under direction of Mr. George F. Eglinton. Die is still in daily use.

You get more carbide benefits with Carboloy dies and services!

For blanking, forming, drawing and piercing dies that will stand up under terrific hour-after-hour pounding . . . always specify Carboloy Cemented Carbide.

It's quality-controlled by 29 rigid, probing tests that stem from Carboloy experience as world's largest maker of cemented carbides.

You get extra die life from Carboloy Cemented Carbide — hardest metal made by man — because extra life is built into it!

Carbide benefits

You or your die maker may order Carboloy Cemented Carbide made to your specifications in rough-finished form. You get all carbide benefits . . . and final finishing and assembly into your dies are easily done in your own toolroom, or by your die maker.

Carbide specialists

Carboloy Field Engineers are ready with on-your-job solutions to tough die problems . . . and ready to help you design new carbide applications.

Carbide training

Your key toolroom personnel can learn latest carbide techniques, become expert in finishing and servicing carbide dies at the Carboloy Customer Training School.

Carbide data

For a handy, all-inclusive guide showing how easy it is to design, use and maintain carbide dies, write for the Carboloy Die Engineering Manual, D-124.

To get the complete story of how Carboloy dies and engineering services offer more carbide benefits . . . greater production with less downtime and maintenance . . . fewer rejects and less refinishing . . . call in your local Carboloy representative or use the handy coupon below.

"Carboloy" is the trademark for the products of Carboloy Department of General Electric Company.

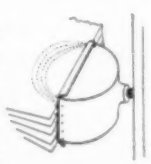
CARBOLOY

DEPARTMENT OF GENERAL ELECTRIC COMPANY

11101 East 8 Mile Road, Detroit 32, Michigan

Plants at Detroit, Michigan; Edmore, Michigan; and Schenectady, New York

Magnet ideas for the shop!



Use Carboloy Permanent Magnet Sheet-Steel Separators to prevent feeding of doubles. And use permanent magnets to give an extra hand all around your shop. They're great for magnetic stands, tool-holding devices, sweepers' pickup tools, magnetic paper grippers, containers for small parts and magnetic retrievers. Write for Carboloy Permanent Magnet Stock Catalog, PM-100. (Use coupon.)

CARBOLOY Department of General Electric Company
11101 E. 8 Mile Road, Detroit 32, Michigan

We are interested in the Carboloy services checked below:

☐ Die Training School ☐ Die Engineering Manual, D-124 ☐ Permanent Magnet Stock Catalog, PM-100 ☐ Have a Carboloy Field Engineer call.

Name _____ Position _____

Company _____

Address _____

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FINE-EDGE CUTTERS

Want high

Edge Strength?

You can get it

with DBL-2 HIGH-SPEED STEEL

Write for copy of

"CUTTING TOOL MATERIALS"

Allegheny Ludlum produces *all* types: the various tungsten and "moly" high-speed steels, cast-alloy materials, and cemented carbides. This 36-page booklet analyzes and compares types, and covers grade selection, etc.—invaluable data for production men. *Write for your copy.*

ADDRESS DEPT. TE-39

A midwestern tool manufacturer, specializing in fine-edge cutting tools, has found DBL-2 *best* for their purpose—added proof of the high edge strength and excellent cutting qualities of this high-speed steel.

DBL-2 (typical analysis: C .80, W 6.00, Mo 5.00, Cr 4.00, V 1.75) represents the 6-6-2 or M-2 type of tungsten-molybdenum high-speed steel. DBL-2 combines high hardness with toughness. Requiring no more than reasonable care in hardening and tempering, you will find it a high-speed steel of great possibilities—capable of giving you performance equal to, or better than, the general-purpose tungsten types, and at reduced cost.

DBL-2 reliability has been proved in a wide variety of cutting tools. Let us help you to use DBL-2 . . . our Mill Service Staff is at your command.

● *Allegheny Ludlum Steel Corporation, Henry W. Oliver Bldg., Pittsburgh 22, Pa.*

For complete **MODERN** Tooling, call

Allegheny Ludlum

AL FINE TOOL STEELS SINCE 1854

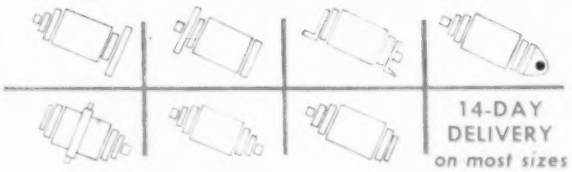
W&D 3639

interchangeable mounts . . .

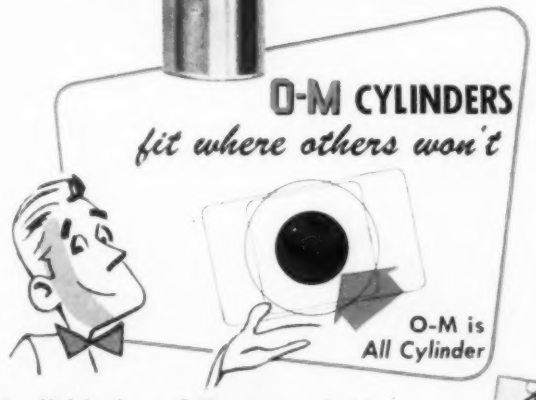
make

O-M CYLINDERS

adaptable to any installation! . .



Because the end plugs are tapped for universal mounting, any one type or combination of mounting brackets can be used to install an O-M Cylinder . . . *without disassembling or changing the cylinder.* Interlocking mechanism eliminates projecting end caps and tie rods, assuring better alignment and friction-free performance. Thus, O-M Cylinders fit where others won't . . . require ⅓ less space than conventional type cylinders of the same bore . . . are easily removed, inspected, repaired.



Available in a full range of sizes (1½" to 8" bores) with standard, 2 to 1 or oversize rods. All machined steel with bearing bronze, no castings. Completely interchangeable parts.

Write today for FREE catalog and complete set of ½ and ¼-scale templates showing all cylinders and mounting brackets.

ORTMAN MILLER MACHINE CO.

1216 150th Street, Hammond, Indiana

☐ Please send latest O-M Catalog
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Name ..... Position .....

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City ..... Zone ..... State .....

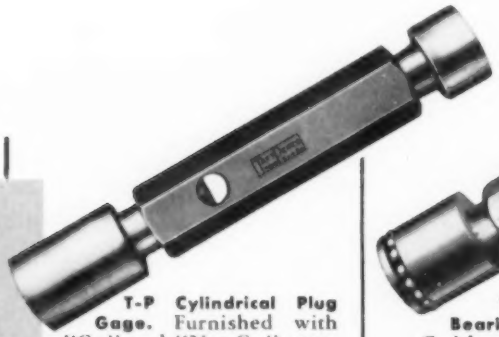
mail coupon now!

TIPS FROM TAFT-PEIRCE ON:

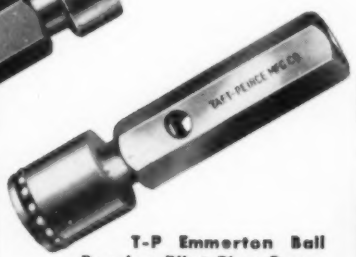
Selecting a FIXED GAGE

The *best* gage for most jobs provides the *best* combination of speed, wear-resistance, upkeep, and initial cost. When it comes to Fixed Gages, here are some comparisons that will help you make your selection.

Plain Plugs



T-P Cylindrical Plug Gage. Furnished with "Go" and "Not Go" separately, or on opposite ends of handle. Progressive gage — with "Go" and "Not Go" on same end increases speed.



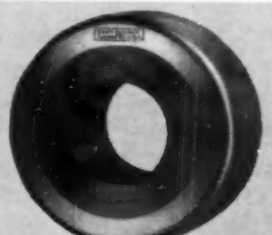
T-P Emmerton Ball Bearing Pilot Plug Gage. Guides gage into alignment. Won't jam. Eliminates end-wear, or burring — valuable on soft metals. Gages faster, lasts longer.

T-P Carbide, Norbide, and Chromium Plated Plugs. For exceptional resistance to abrasion or scratching. Maximum wear-life. Brittleness requires care in handling.

Plain Rings

T-P External Ring Gage. For reference purposes, setting air or other variable gages and accurate size control of parts.

T-P Chromium-Plated Ring. Lowers gaging costs on longer runs of highly abrasive materials or hardened steel. Provides up to 5 times more service.

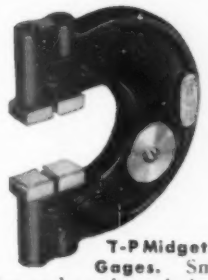


T-P Norbide and Carbide Rings. For greatest wear-resistance. Available in Norbide and Tantalum or Tungsten Carbide. Brittleness requires careful handling.

THE TAFT-PEIRCE
WOONSOCKET,

Adjustable Snaps

T-P Plain Adjustable Snap Gages. Available with gaging pins, round or square buttons, and solid anvils in combination with buttons.



T-P Midget Snap Gages. Smaller in size and section, their light weight aids in gaging small or delicate parts. Maximum rigidity and stability are provided.

T-P Cemented Carbide or Norbide Snaps. For close tolerance work on abrasive materials. Gaging members tipped with Tungsten or Tantalum Carbide. Or with Norbide inserts, as shown.

Thread Plugs

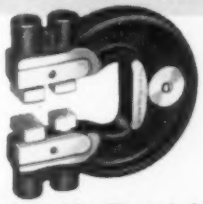
T-P Limit Thread Plug Gage. Available in Taper Lock or Trilock design. Taper Lock up to 1.510". Reversible from No. 0 to ½". Reversible Trilock above 1.510".

T-P Carbide Thread Plug Gage. For longer wear. Furnished both standard and special from #8 machine screw size up.

T-P Truncated Thread Set Plug Gage. Sets and checks thread gages with greater accuracy. Checks thread angle and O. D. Indicates wear, or oversize.

Thread Rings & Snaps

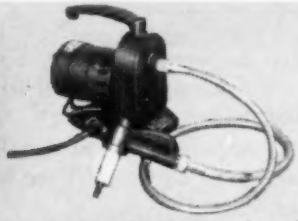
T-P Thread Ring Gages. Single unit clamping device simplifies setting, increases accuracy, eliminates distortion. Locks without changing pressure on ring.



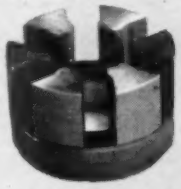
T-P Adjustable Thread Snaps. Faster than ring gaging, and just as accurate, they check lead, angle, and all other thread elements. Variable pitch diameter.

T-P Roll Thread Snaps. Same as Adjustable, with *rolls* for gaging members. Since gaging members rotate, wear is spread over greater surface and service life increased.

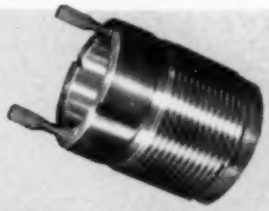
Special Gages



T-P Rotacheck. Fastest thread gaging method. Push — and the gage screws into the work. Release the pressure and it stops. Pull—and it disengages.



T-P Spline Gages. A special gage due to the diversity of individual requirements. Thousands of such special gages are made at Taft-Peirce every year.



T-P Thread Concentricity Gage. Checks size and location of internal threads. Another example of infinite variety of fixed gages made by T-P.

Gage Blocks

T-P Gage Blocks. For the ultimate in accuracy. Measures increments down to 0.00005". Available in small or large sets, or individually. Carbide Wear Blocks also available.

MANUFACTURING COMPANY
RHODE ISLAND

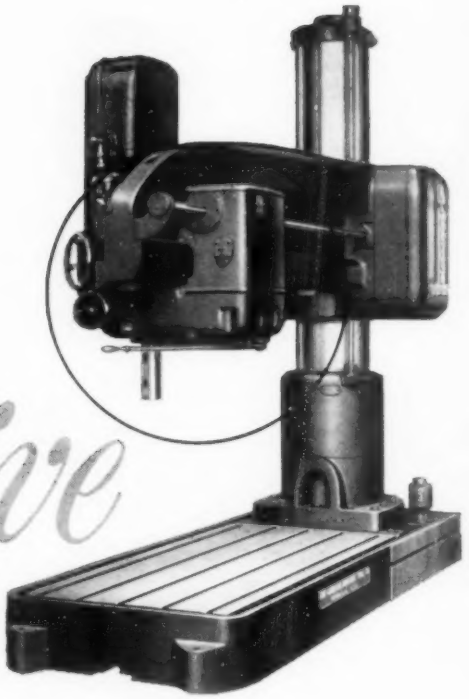
T-P means Top Precision

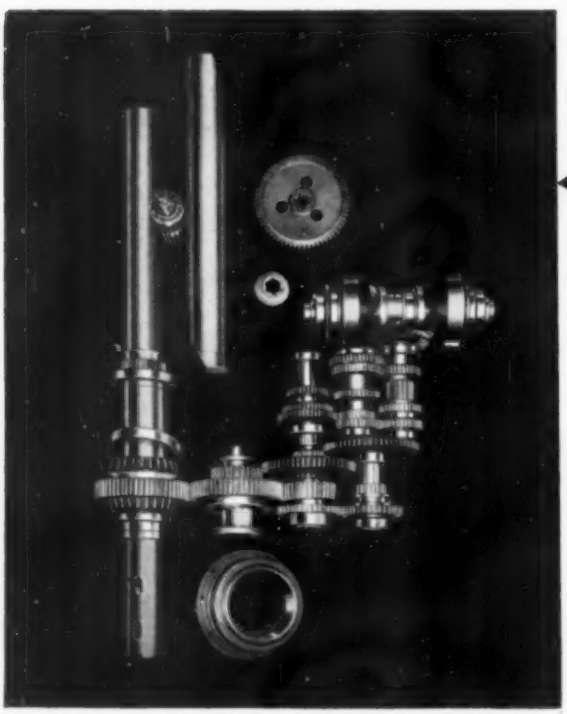
For the complete story on these items, and many more, get your copy of the new Taft-Peirce Handbook.

comparison proves Carlton's

low hung drive

is without comparison





the main drive gear in all Carlton Radial Drills is placed in the *lowest part of the head.*

It drives on the *largest diameter* of the spindle, *closest to the cutting tool* . . . a principle well established by its wide use in planers, lathes and milling machines.

When you compare other radial drill driving mechanisms with Carlton's Low Hung Drive, you'll see why the overwhelming preference is for Carlton.

Thanks to the Low Hung Drive, Carlton can use an extra large spindle. And since the drive is always applied on the largest diameter of the spindle, it minimizes spindle twist . . . permits the use of higher speeds and greater feeds.

This principle—together with all ball bearing construction, low, centralized push button controls, modern lubrication, power clamping of arm, head and column, and Carlton's many other advantages—means increased "hole" production for you.

Why not write us today for bulletins describing the Carlton Radial Drills you need?

Carlton

THE CARLTON MACHINE TOOL CO.

THE CARLTON MACHINE TOOL CO., CINCINNATI 25, OHIO

CONSERVE YOUR MAN-POWER

YOU CAN'T MACHINE IT ECONOMICALLY UNLESS YOU HOLD IT RIGHT

CUSHMAN

AIR CHUCK EQUIPMENT

There is a correct type of standard or special chuck and jaw equipment for every chucking job. Cushman's background of experience in this specialized field can usually help you find it and thus save time and money, while frequently simplifying set-up methods.

This is especially true in the comparatively new field of AIR CHUCKING. Cushman's very complete line of Precision Air-Operated Chucks, High Speed Air Cylinders and Accessories, and the Cushman Power Wrench, offers almost unlimited possibilities in tooling for economy and speed without sacrifice of quality. Our engineers will welcome your problems.

The Cushman Power Chuck Catalog No. PO-64TE covers our complete line of Air Chucks, Air Cylinders, and Accessories . . . Cushman Manually-Operated Chucks are separately described and listed in Catalog No. P064TE.

Either or both will be sent on request.

THE CUSHMAN CHUCK COMPANY
HARTFORD 2, CONNECTICUT, U. S. A.
Chucking Engineers Since 1862

Manufacturers of

AIR CHUCKS, CYLINDERS, and ACCESSORY EQUIPMENT • THE CUSHMAN POWER WRENCH • CUSHMAN MANUALLY-OPERATED CHUCKS and FACE PLATE JAWS.

A WORLD STANDARD FOR PRECISION

10C852

AIR CIRCUIT DESIGN AND COST SIMPLIFIED BY AIR CYLINDER WITH BUILT-IN VALVE . . .

VALVE AND ALL OPERATING CONTROLS ARE INTEGRAL WITH THE CYLINDER. Only one air connection is required.

In pneumatic circuits the closer the valve to the cylinder, the faster, more economical and more efficient is the operation. The advantages of "close-coupling" are universally recognized by pneumatics engineers. But only Bellows offers the ultimate in "close-coupling" — an air cylinder and valve as one integral unit.

This unique Air Cylinder, with its built-in valve, is known the world over as the Bellows Air Motor. It has brought a new simplicity and effectiveness to pneumatics operation. It has created an entirely new conception of the use of air power in production processes.

In the decade since the first Bellows Air Motor was built almost 20,000 manufacturers have installed these compact power units. In many plants as many as a thousand Air Motors are in use; in many plants Bellows Air Motors operate 24 hours a day, month in, month out, building operating records of thirty, forty, even fifty million cycles.

No matter what you make, how big or how small your plants, you can use Bellows Air Motors to speed production and cut costs in a host of operations.

THIS 36-PAGE BOOKLET TELLS THE STORY . . . .

Just off the press. Filled with data every production man can use. Free on request.

Write Dept. TE 353 The Bellows Co., Akron, Ohio. In Canada: Bellows Pneumatic Devices of Canada, Ltd., Toronto 18, Ontario, Canada.

The Bellows Co.

AKRON 9, OHIO

697-A

"CONTROLLED AIR POWER" FOR FASTER, BETTER, SAFER PRODUCTION

FOR THOSE TOUGH *Special* JOBS . . . DEPEND ON

National Tool Co.

● Years of successful experience in *special* tooling and related production problems are yours for the asking. When the job requires *special* cutting tools call in your National Tool Co. representative. He is backed by more than 46 years experience in the engineering and manufacture of *special* cutting tools. His assistance is yours, without obligation, whether you're interested in one tool or a complete tooling program.

Since 1905 engineers and manufacturers of high-quality special cutting tools for the metal-working industry

National Tools Cleveland

National
TOOL CO.
Cleveland 2, Ohio

TRY THIS Hapman TUBULAR CONVEYOR QUIZ:

Let's assume you're a Conveyor-Project Engineer employed by Hapman —

QUESTION 1—Which materials in panel would you advise can be efficiently handled by Hapman Tubular Sealed-pin Chain Conveyors?

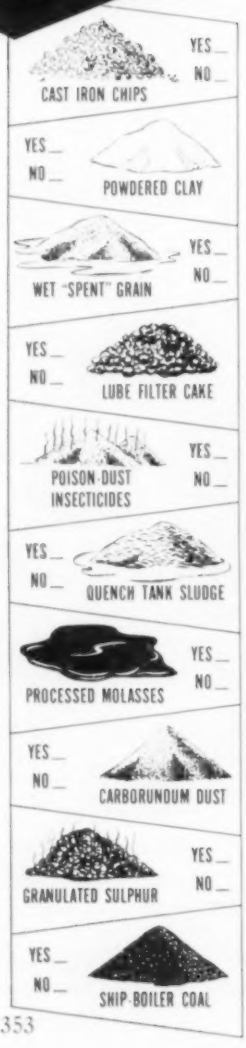
QUESTION 2—To elevate a granulated chemical 29 ft. above floor, at 2,000 lbs. per hour, what motor would you specify?

1 H.P.____ 2 H.P.____
3 H.P.____ 5 H.P.____

QUESTION 3—A prospect asks, "What is the *outstanding* advantage of a Hapman Tubular Conveyor?" What's your reply?

ANSWERS: 1—All now successfully handled except sticky molasses. 2—One horsepower. 3—Hard to answer. In one case, ability to convey *wet* material is vital; in another the Hapman's air-tight seal keeps moisture or dust *out*—or fumes *in*. Ability to curve around obstacles may be essential. Your best answer: "They cut costs!"

NOW SEND YOUR QUESTIONS!



Write for details and Bulletin TE-353

Hapman CONVEYORS, INC.
DIVISION HAPMAN-DUTTON COMPANY
KALAMAZOO MICHIGAN

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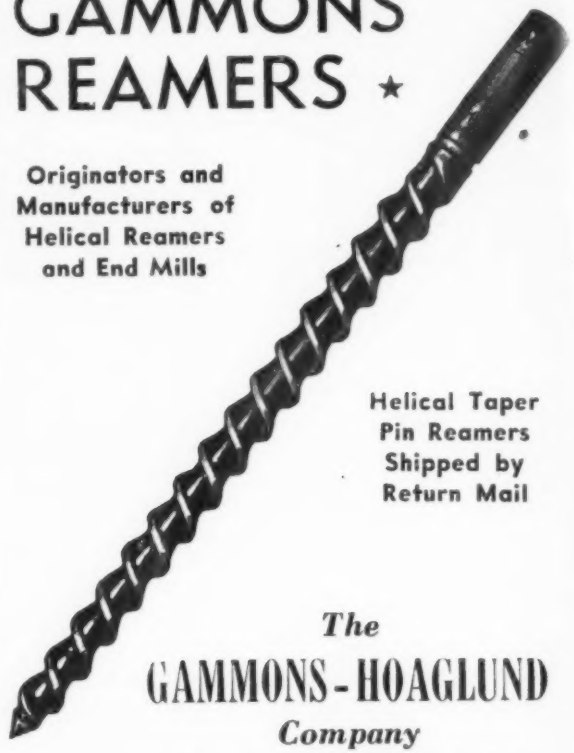
GAMMONS REAMERS ★

Originators and Manufacturers of Helical Reamers and End Mills



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COUPLING BOLTS
MILLED STUDS
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Write for name of nearest distributor and our free illustrated folder.

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Outstanding British Machine Tools
sold and serviced in the United States by

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BRITISH INDUSTRIES CORP. INTERNATIONAL MACHINERY DIVISION
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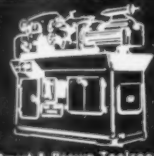
CVA Automatic Screw Machines

Jones & Shipman Hydraulic Surface Grinders

Parkinson Horizontal Milling Machines

Ward Saddle Type Lathes

Churchill Plain, Universal & Internal Grinding Machines


Smart & Brown Toolroom Lathes

Kearns Horizontal Boring Machines

Colchester Geared Head Engine Lathes

Jones & Shipman Universal Tool & Cutter Grinders

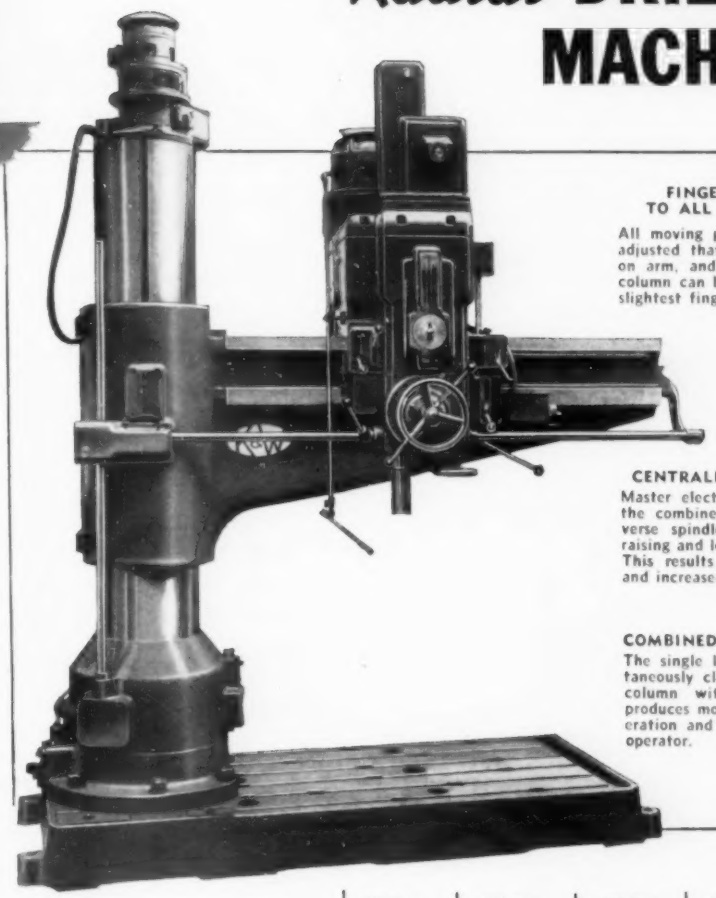
Kitchen & Wade Radial Drills

DCMT Die Casting Machines

Kearns Optimetric Jig Mill

* LOWEST UNIT DRILLING COST

KITCHEN & WADE *Radial* DRILLING MACHINES



FINGERTIP EASE TO ALL MOVEMENTS

All moving parts are so finely adjusted that traverse of head on arm, and swing of arm on column can be actuated by the slightest fingertip pressure.

CENTRALIZED CONTROL

Master electric switch controls the combined forward and reverse spindle action, plus the raising and lowering of the arm. This results in easy operation and increased production.

COMBINED LOCKING LEVER

The single locking lever simultaneously clamps the head and column with one movement, produces more efficiency in operation and less fatigue to the operator.

KITCHEN & WADE E 27

Column . . . 17″
Radius . . . 6′ to 8′

*In selecting a radial drilling machine, it is essential to compare 3 basic production factors:

- Rate of drill penetration,
- Amount of Labor Cost in "setting-up" time,
- Amortization of capital investment against number of holes drilled.

Versatile **KITCHEN & WADE RADIAL DRILLS** compare favorably with the finest machines in the first 2 factors.

Most important . . . it has been proven that their advanced features, sensitivity, and **low initial price**, make them especially desirable in producing quality work at **exceptionally low cost per-hole-drilled.**

EXCELLENT DELIVERY!

Name and Model	Kitchen & Wade E25	Kitchen & Wade E26	Kitchen & Wade E24	Kitchen & Wade E27	Kitchen & Wade E28
Diameter of Column	10″	12″	14″	17″	20″
Radius of Drill Spindle	4′	5′	6′	8′	10′
Drills from Solid in Mild Steel	1½″	2″	3″	3″	3½″
Diameter of Spindle	1⅛″	1½″	2″	2½″	2½″
Traverse of Saddle Along Arm	34¾″	46¾″	55″	74″	96″
Morse Taper of Spindle	No. 4	No. 4	No. 5	No. 5	No. 5
Spindle Speeds — Number	8	8	12	36	36
Spindle Speeds — Range RPM	80-1500	80-1500	50-1250	8½-800	8½-800
Feeds — Number	4	4	4	9	9
Feeds — Range Inches per Rev.	.0045-.013	.006-.025	.007-.025	.007-.025	.007-.025
Horsepower of Main Motor	3	4	5	10	15
Net Weight in Lbs.	5000	7400	11,200	15,000	25,000

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- 48 Pages • 132 Illustrations
- Machines arranged by type, size and capacity
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• #5, #4, #3, #2, #1½ and #1 Universal, Vertical and Horizontal Milling Machines.
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• 15" and 30" Universal Gear Hobbers.
• Toolroom and Engine Lathes from 10" x 20" to 16" x 60"
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Learns Optimetric Jig Mill

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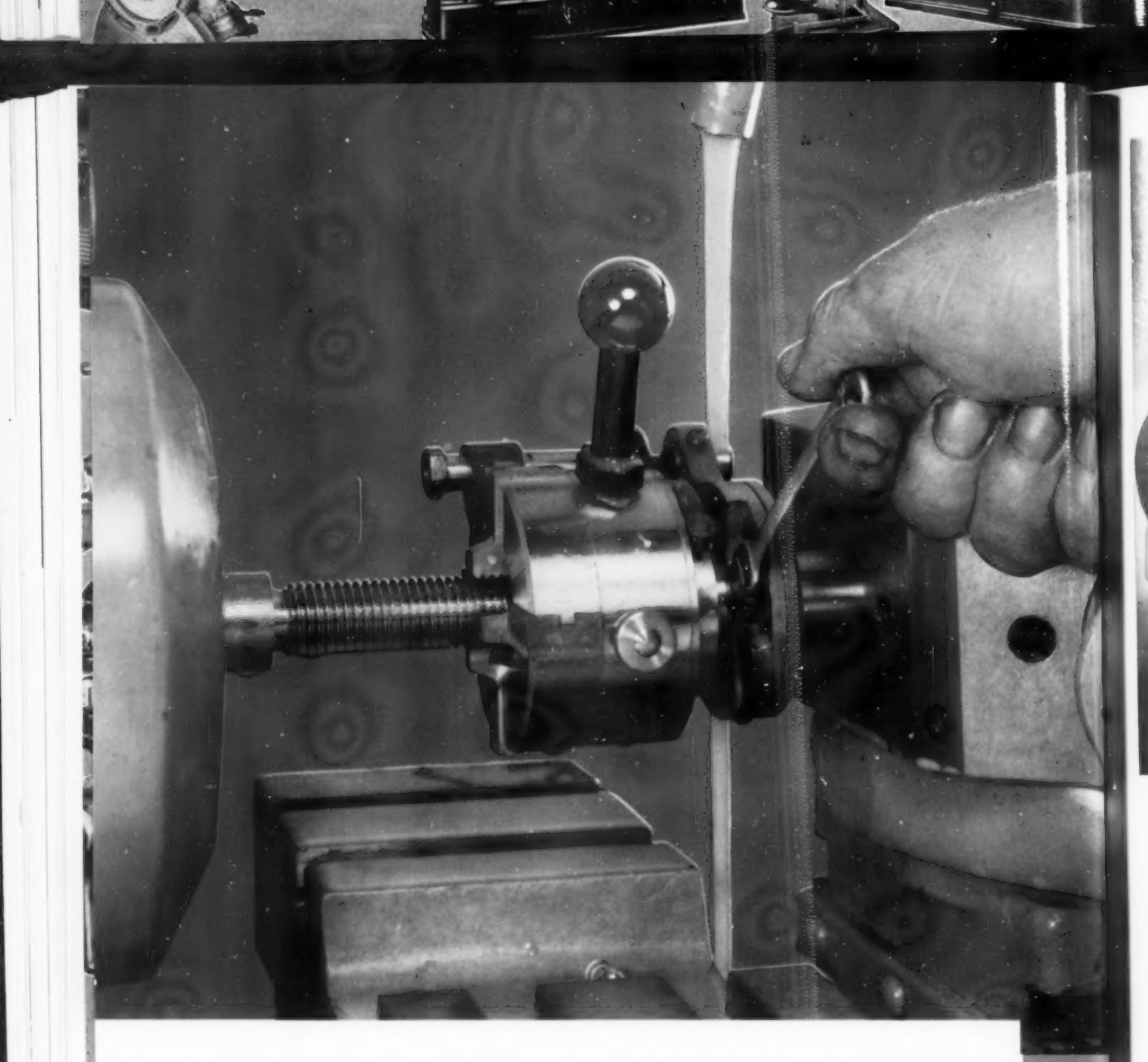
SCENE 114:
"3 Taps in 1"
...an actual scene from the GTD-Greenfield sound film "FACTS ABOUT TAPS AND TAPPING"
VOICE: "Sometimes a very special tap is the only solution to a difficult threading problem . . . Here we see a special tandem tap designed by GTD–Greenfield engineers to enable a pump manufacturer to tap three concentric holes in one operation . . . Special taps may far offset higher initial cost in greater production on the job."
GREENFIELD
TAP AND DIE CORPORATION
GREENFIELD, MASSACHUSETTS
This 26-minute full-color motion picture "FACTS ABOUT TAPS AND TAPPING" is now available for group showing through your local GTD-Greenfield distributor.



MISALIGNMENT EASILY CORRECTED

Misalignment is a serious matter in threading and should be rectified as soon as possible. With the GEOMETRIC DS Head, however, uninterrupted production may be maintained on slightly misaligned jobs until permanent adjustment can be conveniently made.

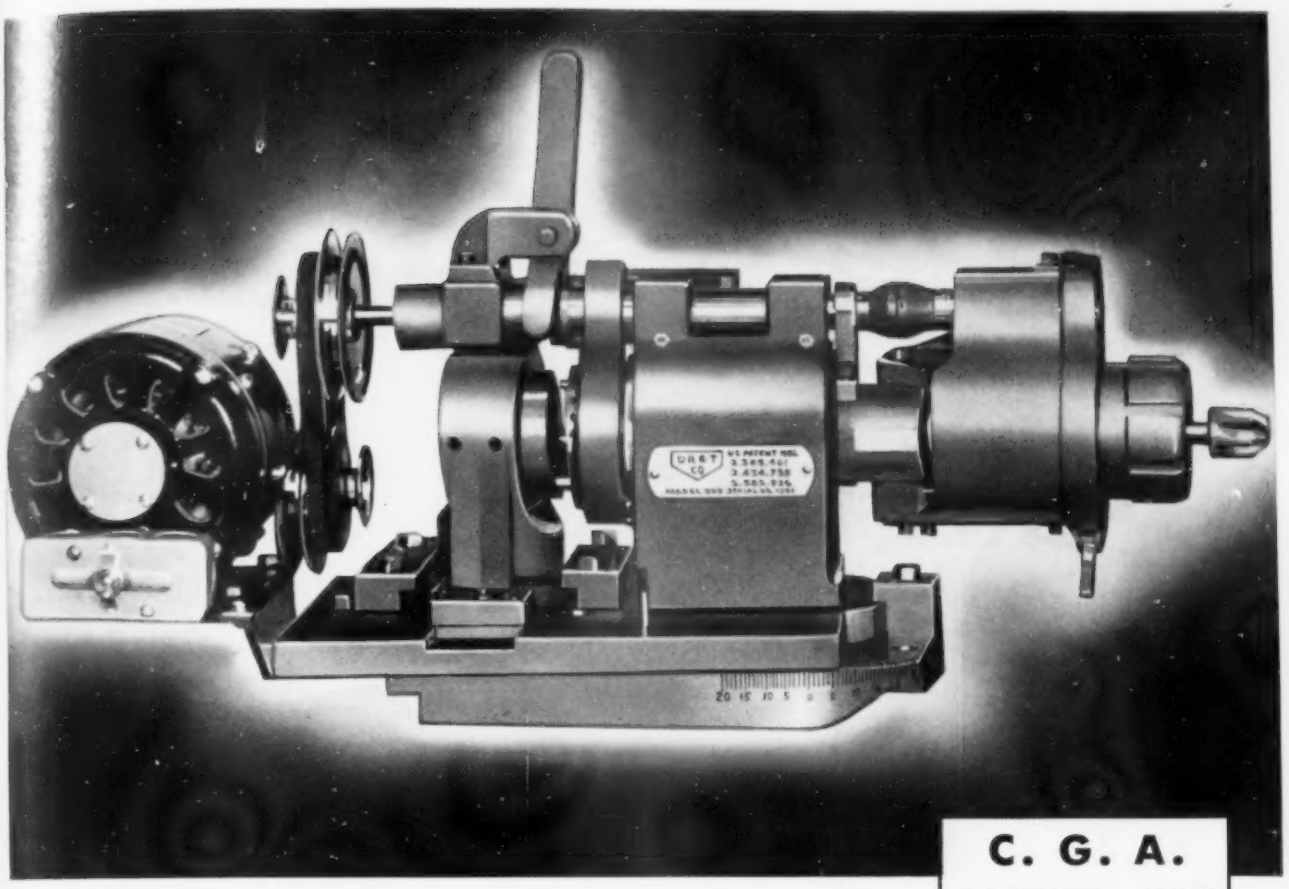
By loosening two "back screws" on the ALIGNING SHANK, the head is allowed to float. A true-running work blank may then be threaded and the head, thus aligned, retightened with the "back screws."

Write for full details. Specify Bulletin DS

Greenfield Tap and Die Corporation

GEOMETRIC TOOL COMPANY DIVISION

NEW HAVEN 15, CONNECTICUT



C. G. A.
MODEL 500

New CIRCULARITY. . . . .
GRINDING ATTACHMENT

Detroit Reamer & Tool Company engineers, after months of intensive research and extensive development, have produced in the model 500 Circularity Grinding Attachment a new device that has many outstanding improvements. This new model is faster, easier to handle, has positive control, greater adaptability, rugged construction, and is engineered and precision built to provide the finest in precision work. Therefore, it will be of invaluable assistance to anyone whose tooling standards must meet modern production requirements.

Simple, speedy set-ups on this accurate attachment permit fast and easy grinding of form relief, radial relief, form and radial relief together, tapered cylindrical and straight cylindrical. Cutting tool to be produced or reworked is held in collet or between dead centers and revolves on its own axial center. Where full length of spiral cutting tools is to be ground for both form and radial relief, the Circularity Grinding Attachment travel is similar to an O.D. grinder, which insures fine finish, back taper and accurate size.

DETROIT REAMER & TOOL CO.

2830 E. SEVEN MILE ROAD • DETROIT 34, MICH.

D R & T COMPANY

The above **Talide Tipped Centerless Blades** illustrate the wide range and variety of work supports we make. In addition to standards, you may need blades for grinding multiple diameters, steps, tapers, contours or special shapes. You can obtain any shape or size of blade required for your centerless grinders from our extensive stocks or engineering files.

As a production man or designer, you are familiar with the advantages of **Talide Carbide.** This super-hard metal outwears any conventional material as much as 50 times. Notice, too, the long one-piece strip (up to 100") which eliminates chance of scratching or marring expensive ground and polished parts.

You can obtain **Talide Centerless Blades** on same day or 24-hour service from our warehouses in Newark, Youngstown, Detroit or Chicago.

Write Metal Carbides Corporation, Youngstown 7, Ohio.

METAL CARBIDES CORPORATION
MC
TALIDE
YOUNGSTOWN 7, OHIO

SINTERED CARBIDES · HOT PRESSED CARBIDES
TUNGSTEN ALLOY HEAVY-METAL
OVER 25 YEARS' EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY

For special blades, send us prints direct to Youngstown. Prompt quotations.
New Blade Catalog 52-G *available upon request.*

PARKER • MAJESTIC PM PRECISION MACHINES

Pictured here is the home and products of

PARKER-MAJESTIC, INC.

For almost a quarter of a century this company has manufactured the **Parker** Spindles used in Precision Grinding, Boring and Milling applications. Additional products include the well known line of **Parker-Majestic** Internal, External, No. 2 Surface and Rotary Surface Grinders.

Descriptive literature upon request.

PARKER-MAJESTIC, INC.

formerly MAJESTIC TOOL & MFG. CO.

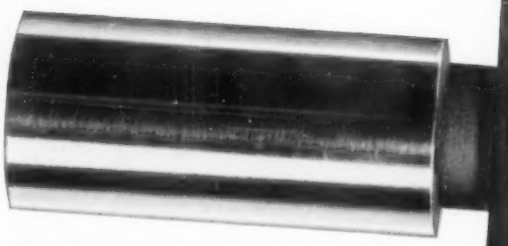
147 JOS. CAMPAU • DETROIT 7, MICHIGAN

how SURFACE DEFECTS impair bearing operation

No matter how smooth a ground surface may appear, examination will reveal imperfections in the form of grinder scratches and ridges, feed spirals, chatter marks and partially loosened metal splinters. Upon contact, these minute peaks and ripples interlock with the mating surface of the bearing, tending to rupture the protective oil film. Fragmented metal is torn from surfaces to mix with lubricant and cause abrasive wear, increasing clearance dimensions and shortening life. Photo at right shows an example of a scratched and galled surface which stopped rotation by "plowing" metal.

how SUPERFINISH insures bearing life

Superfinish removes all surface defects such as grit scratches, feed spirals and the soft "smear metal" caused by grinding heat, and having removed the faulty layer—gets down to metal of the desired structure and hardness. At the same time, it produces a more nearly perfect geometrical form which supports a more efficient oil film for lubrication. There are no projecting defects to churn the oil film or cause metallic contact.



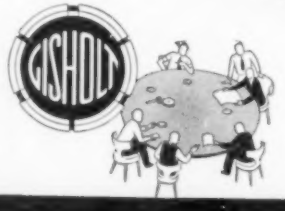
Load carrying capacity is substantially increased by Superfinishing. And bearing life is greatly prolonged.

you should know the facts about SUPERFINISHING!

It may surprise you to know what a quick and inexpensive process Superfinishing really is. It can greatly reduce the cost of grinding and, in many cases, eliminate such expensive operations as hand lapping and polishing.

If you have not yet read the booklet "Wear and Surface Finish," we will be glad to send you a copy of this authoritative text book with our compliments. Please request it on your company letterhead.

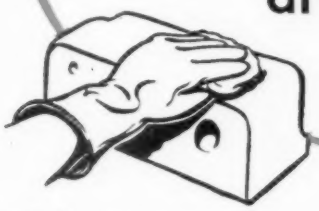
GISHOLT MACHINE COMPANY
Madison 10, Wisconsin



THE GISHOLT ROUND TABLE *represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.*

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

Have you tried this acid-detergent method for removing rust and oil at the same time?



Here is what users are saying about Oakite Compound No. 33

MICHIGAN: "Removing rust for less than 9 cents per wheel; sand blasting cost 25 cents."

TEXAS: "Eliminates practically all rejects and also handwiping of booster caps."

NEW YORK: "Have never seen such clean parts with such perfect paint adhesion . . . Putting Oakite Compound No. 33 in specification sheets for sub-contractors on these registers."

ILLINOIS: "Works a miracle taking heavy rust off steel cabinets."

PENNSYLVANIA: "Well pleased with removal of drawing compound, heat scale, rust and oil. Parts coming through good and clean."

CALIFORNIA: "This material is a beauty . . . one we've been waiting for on this jeep overhaul job."

MICHIGAN: "Removes oil, rust and scale faster . . . Increases adherence of rubber to steel for motor mounts and bumpers."

MASSACHUSETTS: "Removed carbonized smut and scale from rocket parts perfectly in 8 minutes."

MISSOURI: "Results very good. All corrosion removed from battery connectors."

OHIO: "Eliminated one wiping operation . . . Paint really sticks on metal caskets."

NEW YORK: "Beautiful job . . . Removes residues from steel transformer cases . . . eliminates one operation. Delighted with saving. . ."

SPECIALIZED INDUSTRIAL CLEANING

OAKITE

MATERIALS • METHODS • SERVICE

Technical Service Representatives Located in Principal Cities of United States and Canada

Metal craftsmen using Oakite Compound No. 33 say it is just what they've been looking for: a metal-cleaner that combines three important operations into one:

1. **It removes rust** *at the same time that*
2. **It removes oil** *at the same time that*
3. **It prepares the metal for painting**

Oakite Compound No. 33 removes rust, heat scale, tarnish, other oxides, stamping and forming oils, rust preventives, carbon smuts, soldering and welding fluxes, identification inks and similar soils. It develops excellent paint adhesion on steel, cast iron, aluminum sheet and castings.

For Use in Tanks or by Hand—Oakite Compound No. 33 is great for soak-cleaning metal parts of moderate size and great for hand-swabbing on large metal surfaces.

Often Avoids Pickling—Oakite Compound No. 33 removes rust and oil so successfully that it frequently eliminates the need for a cycle of separate cleaning, pickling, neutralizing and paint-conditioning operations. It saves money in many ways.

FREE For a copy of "*New metal cleaner removes oil and rust in one operation*"—describing the use of Oakite Compound No. 33—just drop us a note or mail the coupon.

OAKITE PRODUCTS, INC.
58 Rector St., New York 6, N. Y.

Send me a FREE copy of "*New metal cleaner removes oil and rust in one operation*"
Also, send me information about Oakite methods for the following jobs:

- ☐ Tank cleaning
- ☐ Electrocleaning steel
- ☐ Electrocleaning non-ferrous metals
- ☐ Machine cleaning
- ☐ Pickling
- ☐ Steam-detergent cleaning
- ☐ Pre-paint treatment
- ☐ Paint stripping
- ☐ Burnishing
- ☐ Rust prevention

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COMPANY_____

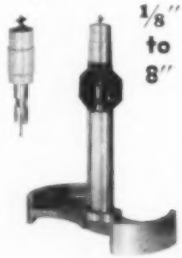
ADDRESS_____

"Packaged Precision"

Measures high-precision holes to fractions of .0001", with these advantages—

Here in a compact self-contained unit, you have the high precision that has found so prominent a place in the jet engine program. By unique design, Comtorplug gives true 2-point gaging, self-aligned and centered. Thus it enables you to check any part of a hole—including very bottom—detecting out-of-round, front or back taper, bell mouth, etc.

- There are no gimmicks to get out of order, such as wiring, hose or electronic gear. And because self-contained Comtorplug has none of these, and no heavy base, it is instantly usable anywhere: machine, bench, or lab.
- Shows actual measurement to fraction of .0001", and is "just right" for Statistical Quality Control programs.
- No skill needed to use it accurately—built-in features and 10 minutes instruction do the trick.
- Marvelous thing about Comtorplug from production man's viewpoint is that you can put it to work in your shop without any planning, wiring, air lines or rigmarole—just a simple briefing on its use.
- Comtorplug is a rugged, shock-proof instrument. Use it for size control at the machine as well as bench inspection, wherever you produce precision holes in volume.



Request Bulletin 46

COMTOR CO.

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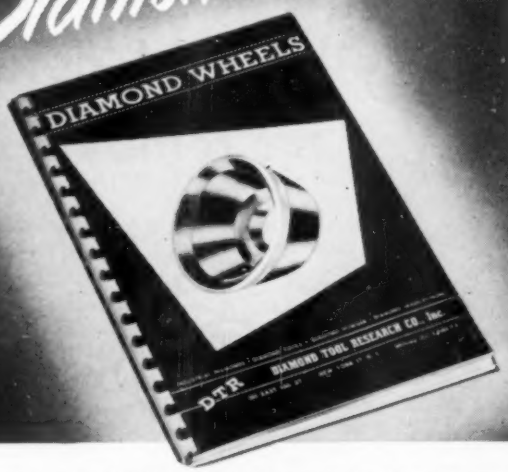

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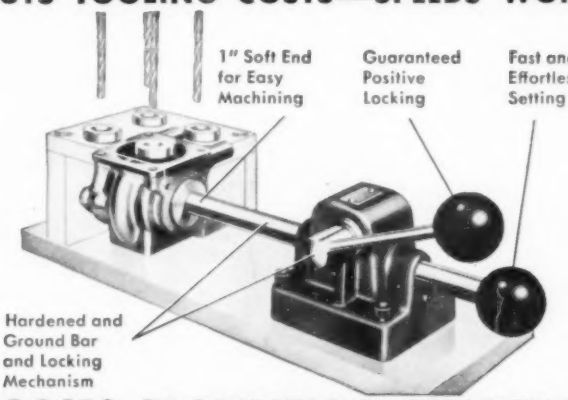
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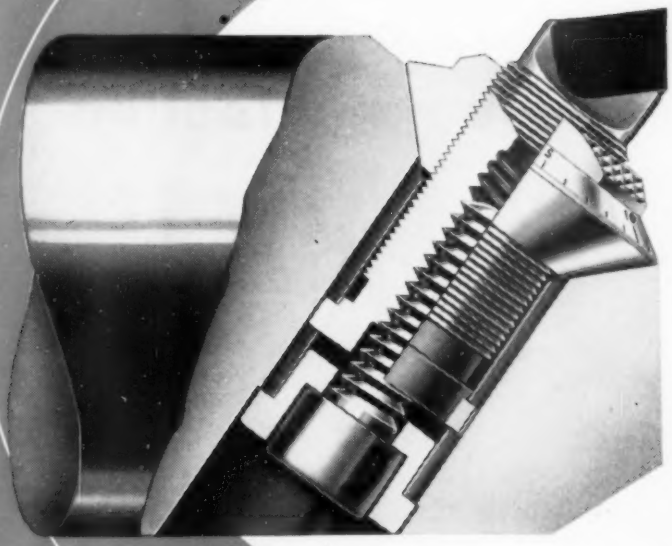

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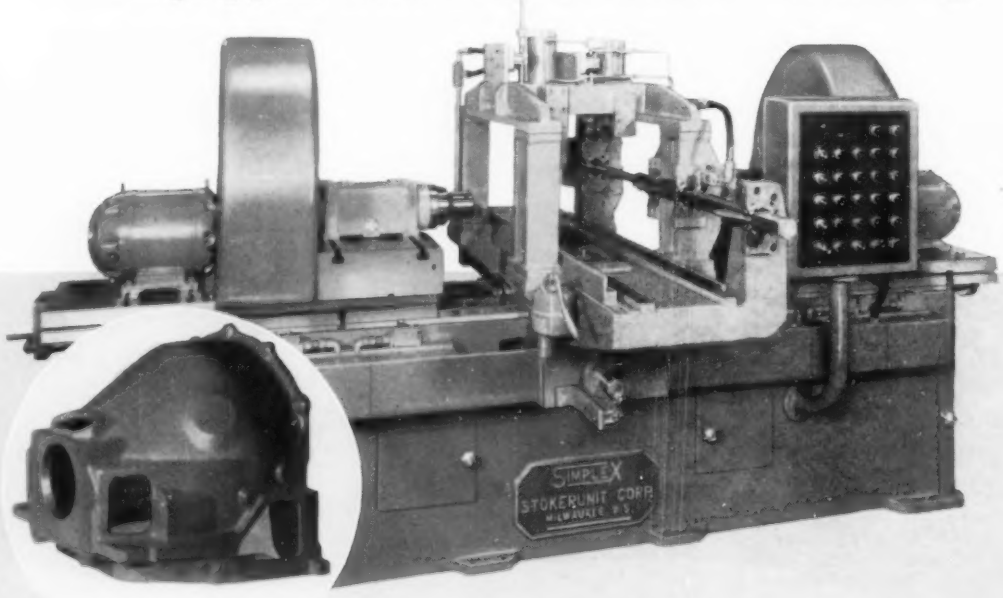

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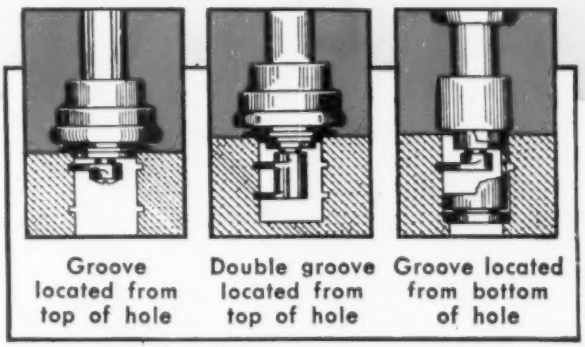

Groove located from top of hole | Double groove located from top of hole | Groove located from bottom of hole

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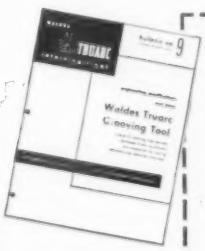

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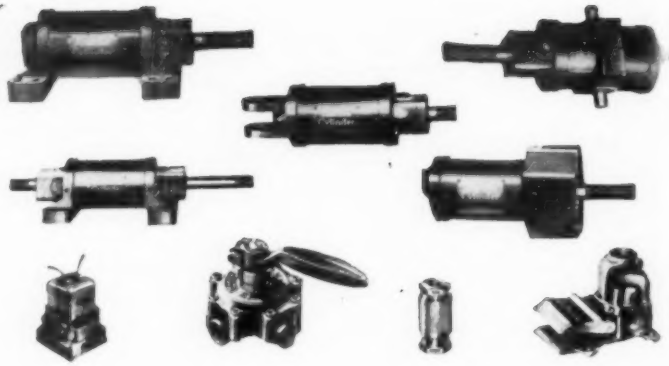

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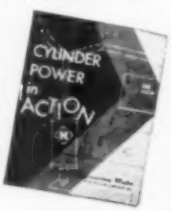

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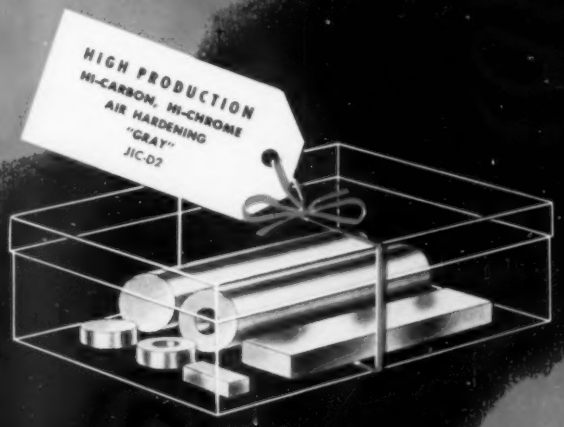

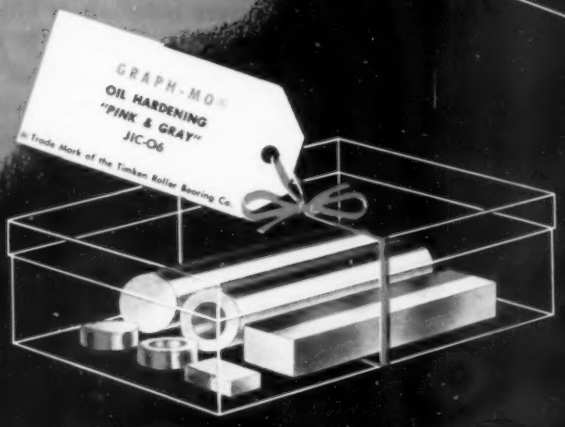

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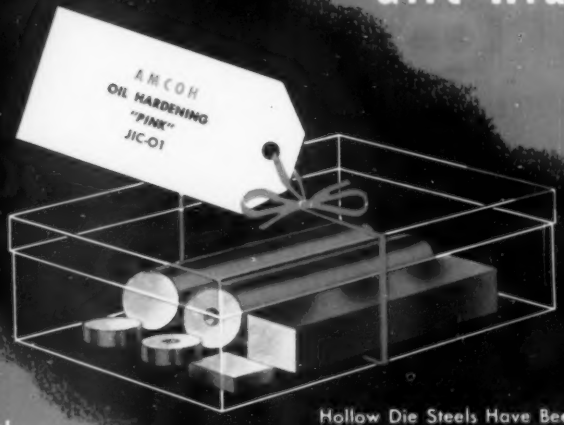

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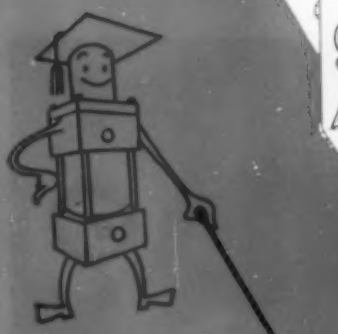

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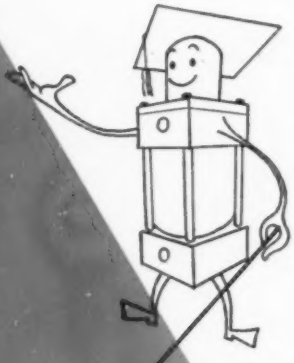

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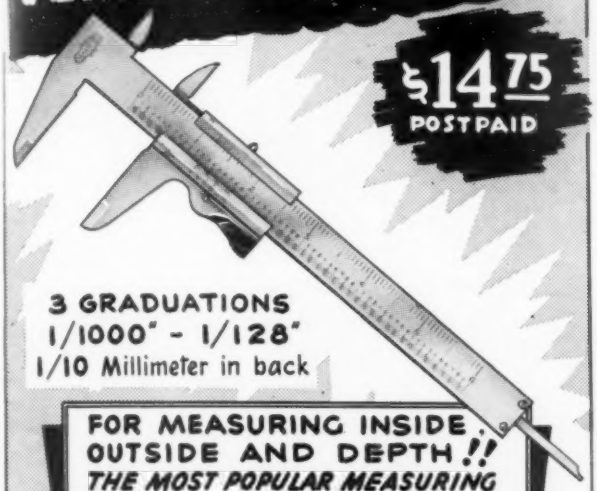

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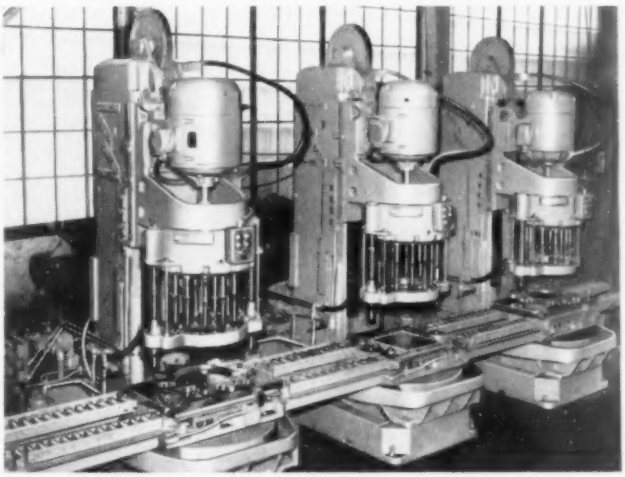

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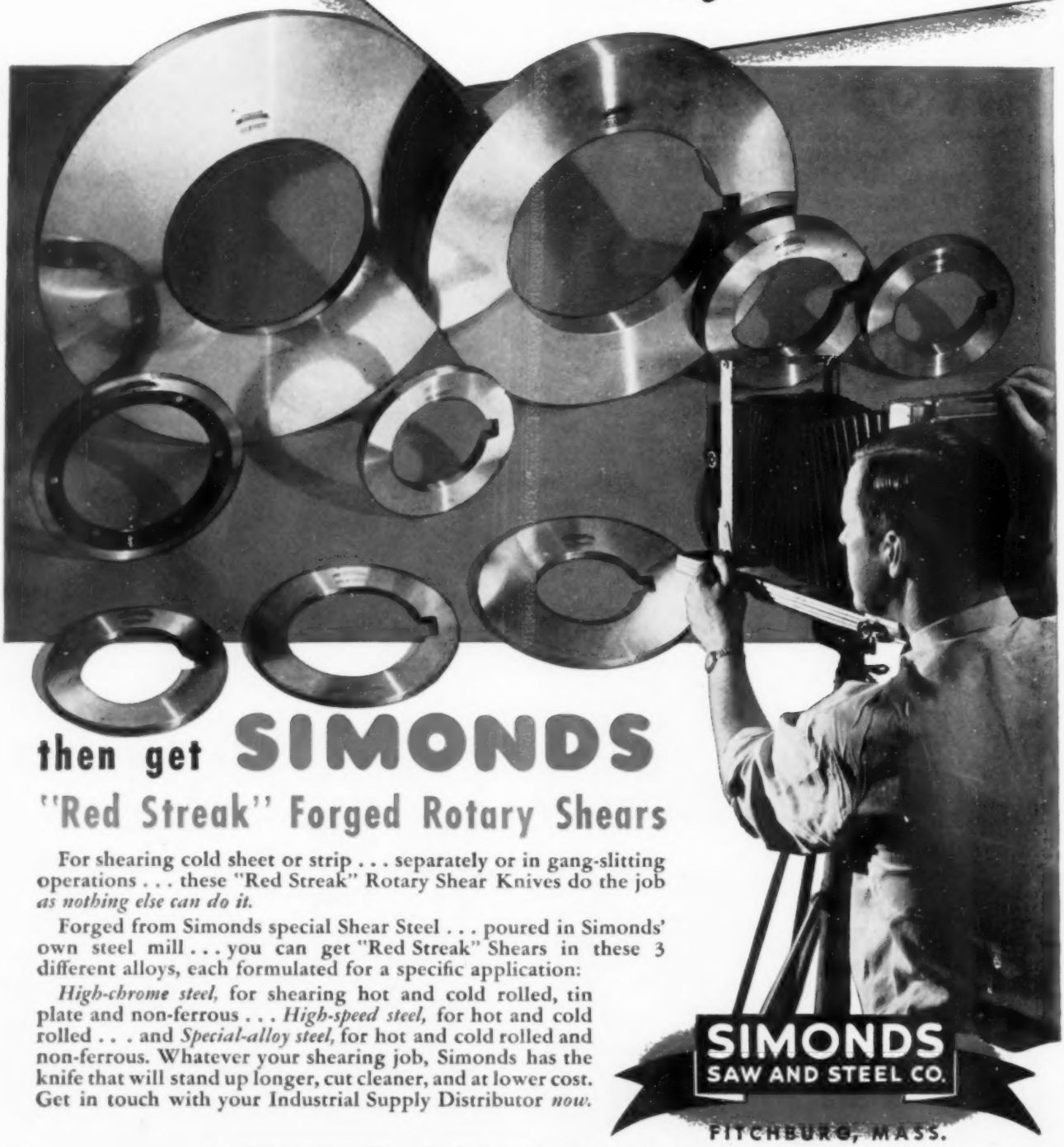

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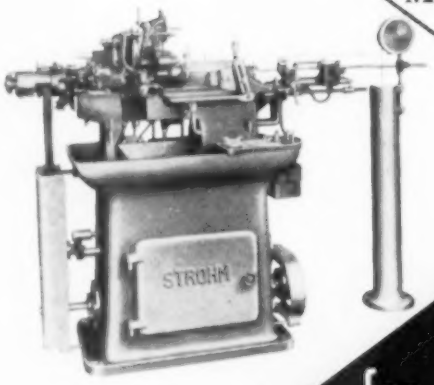

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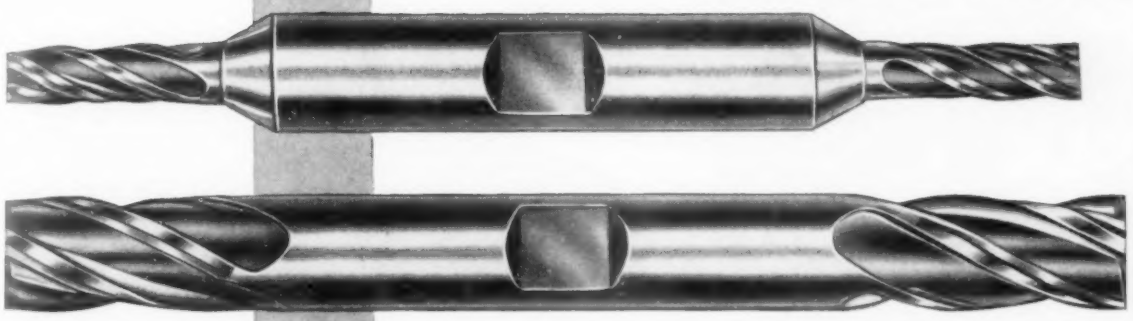

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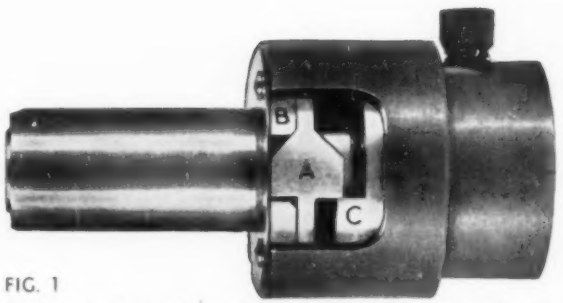

FIG. 1
Ready to start threading operation, clutch slightly engaged at C.

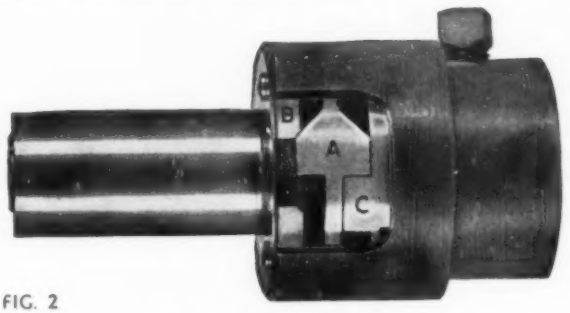

FIG. 2
Instantly engaged to full contact between A and C as soon as tap or die engages work.

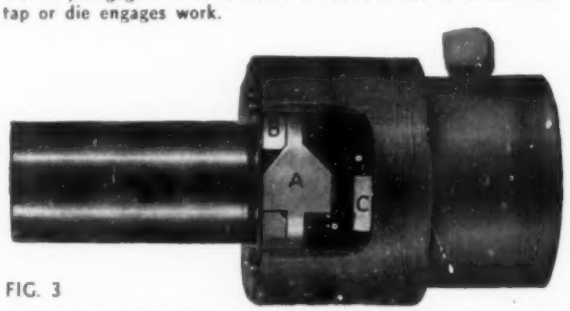

FIG. 3
Fully released showing ample clearance between contact points of clutch preventing reengagement or hammering of clutch points in case turret advances slightly after clutch releases.
By substituting a shorter clutch ring retaining nut this tool can be readily changed for cutting extra short threads.

R AND L TOOLS 1825 BRISTOL ST., PHILADELPHIA 40, PA.

Turning Tool, Universal Tool Post, Floating Drill Holder, Carbide and Roller Backrests, Revolving Stock Stop, Tap and Die Holder, Cut Off Blade Holder, Turret Backrest Holder, Releasing Acorn Die Holder, Knurling Tool and Recessing Tool.

ARROW TOOL & REAMER CO., Established 1916

SPECIAL CUTTING TOOLS FOR 36 YEARS

• SUBLAND DRILLS
• MULTIPLE FLUTED TOOLS •

ARROW produces Special Tools Quickly— Economically
Carbide or H. S. Steel
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for heavy production
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MORTON DRAW-CUT MACHINE TOOLS AND SPECIAL MACHINERY
WELDING MACHINES FOR SUBMERGED AND INERT ARC

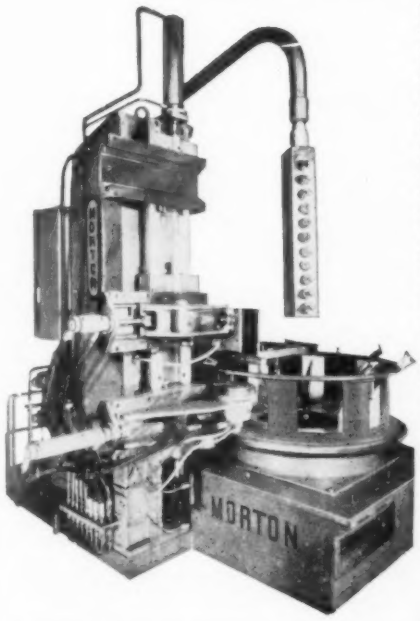
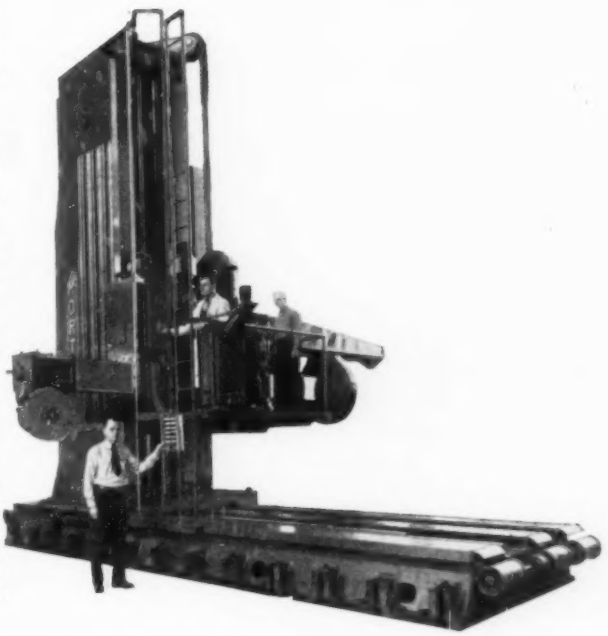


Fig. 3065—Special Horizontal Index Welding Machine designed to weld multiple jet burner plate eyelet flanges. An eight station hydraulic index driving a 42" Rotary Table supports and positions the base fixture. The entire machine is fully interlocked to protect against accidental or improper operational sequence. All machine operations are pendant station controlled. Send for Bulletin No. 43-M covering Morton Girth Welding Machines.

Fig. 2837—Morton Horizontal Boring, Drilling, Milling Machine and Draw-Cut Traveling Head Planer. A Combination Machine Tool you can't beat for multiple jobs on light and heavy production. It has 84" of continuous boring and milling feed, 10' of vertical travel on the column and 21' of horizontal travel on the bed. The 14" square ram is bored to receive a 7" diameter boring and milling arbor which rotates on anti-friction bearings. Variable Voltage Reversing Planer Type Motors and Control Equipment operate this machine. Many Morton attachments applicable to this machine place it in a class by itself as far superior to other types of boring and milling equipment. Send for Bulletin No. 37-M showing this machine.



MORTON FINISHED MACHINE KEYS & SPECIAL SHAPES
Machine Tool Precision is Processed into Each Key
GIB HEAD-PLAIN-FEATHER KEYS — Bulletion 15-M
"HI-PRO" High Production Keys — Bulletion 24-M

We also build Girth, Combined Press and Girth, Angular Girth and Special Welding Machines which will efficiently serve your needs. Send for Bulletin 43-M

Morton Manufacturing Co. - Broadway & Hoyt - Muskegon Heights, Michigan

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-323-3

They're All Scrap

They're all needed to keep steel production up

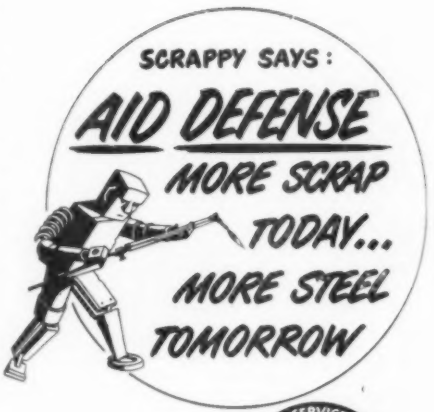
...TO AID DEFENSE

Every pound of unused iron and steel you have is needed to help steel mills and foundries keep production up to rising capacity.

Scrap inventories are alarmingly low. Mills that normally maintain inventories of several months, are now down to a day-to-day basis. Shutdowns are threatened.

One way we can maintain desired level of both military and civilian production is for you to *dig up* and *turn in* your iron and steel scrap now.

Get in touch with your local scrap dealer and write for the free booklet, "Top Management: Your Program for Emergency Scrap Recovery" to Advertising Council, 25 W. 45th St., New York 19, N. Y.



NON-FERROUS SCRAP IS NEEDED, TOO!

This advertisement is a contribution, in the national interest, by

AMERICAN SOCIETY OF TOOL ENGINEERS

10700 Puritan Avenue **Detroit 21, Michigan**

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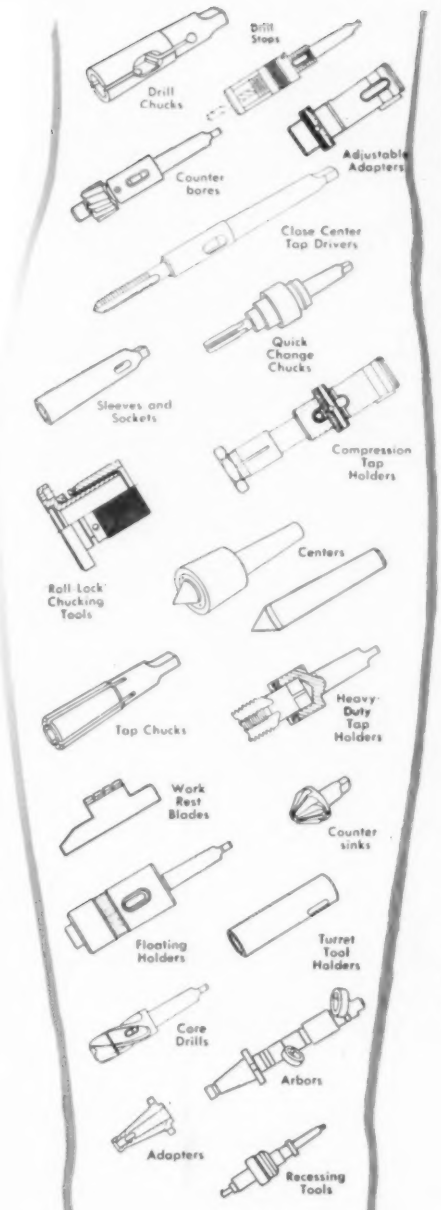


the "ARMS and HANDS" for your MACHINE TOOLS

If you think of a Lathe, Mill, Multi-Spindle Machine, or other Machine Tools as being a human body, supplying power to the parts of the body doing the actual work, then Scully-Jones tools represent the "Arms and Hands".

ACCURACY, SPEED, ECONOMY on END-CUTTING OPERATIONS

with S-J SCULLY-JONES

COUNTERBORES · COUNTERSINKS · CORE DRILLS

These Cutters and Drivers have rigidity of a one-piece tool. Shanks and holes ground concentric to assure true-running cutters; helps produce work to specifications and reduce rejects.

Cutters are solid High-Speed Steel, carefully heat treated and ground to prolong life of cutting edges; assures fast, continuous production; reduces "down time" for re-grinding.

Standard Stub Taper shanks on cutters are easy to insert and eject, saves time changing cutters. Tangs on shanks provide a positive drive; eliminates slipping and tool damage.

1 S-J Counterbore Cutters—solid, High-Speed Steel or Tungsten Carbide Tipped.

2 S-J Countersinks—solid or piloted; **solid,** H.S.S. —with 60, 82 or 90° included angle.

3 S-J Counterbore Drivers—Shown with cutter and pilot. Drive S-J Counterbore Cutters, Countersinks, Core Drills and tools having Standard Stub Taper Shanks.

4 S-J Stub Taper Turret Tool Holders—Shown with countersink and pilot. Eliminate need for conventional type holders and shorten projection between turret and work. Designed for holding S-J Counterbore Cutters, Countersinks, Core Drills and any similar tools having Standard Stub Taper Shanks.

5 S-J Core Drill Cutters—solid H.S.S., 4 flutes, 20° spiral—for enlarging and truing drilled, cored or punched holes. Quickly enlarge holes, because 45% of diameter is cutting.

6 S-J Core Drill Holders—Used where chip removal is a problem. Shown with cutters; 4 flutes, 20° spiral. **Style 1** for deep hole drilling. **Style 2** for shallow hole drilling. May be run through bushing.

7 S-J Style "B" Core Drill Holders—Used where chip removal is no problem. Shown with cutter; shorten overhang and assure rigid set-up. **Only 4** holders required to drive the 25 cutters.

Scully-Jones AND COMPANY

1915 S. ROCKWELL ST., CHICAGO 8, ILLINOIS

WRITE FOR BULLETIN No. 5-50

Shows complete information on S-J Counterbores, Countersinks and Core Drills.

R5904

YOU GET LOW COST FAST ACCURATE PRODUCTION WITH OUR STANDARD AND SPECIAL TOOLS

A YEAR-ROUND "TOOL SHOW"

You can see the S-J Standard Tools (sketched in the column at the left) on display or in operation the year-round, at the Scully-Jones plant. For year-round reference too, you'll find complete information on these and other tools, in the S-J Catalog 600—yours on request, on your company letterhead.

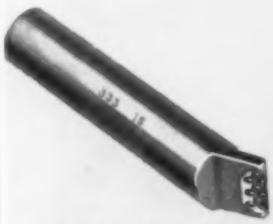
These "arms and hands"—as we like to call them—will help you equip your machine tools for low cost, fast, accurate production.

Whether you select Scully-Jones Standard or Special Tools you can be confident of getting the best that can be produced—the result of 40 years' experience, engineering research, modern equipment, correct materials and expert workmanship. Recently Scully-Jones manufacturing facilities have been further expanded to give you more reasonable deliveries.

Whenever your tooling problems or design programs require outside service, S-J Engineering and Design Service has "heads and hands" to help you. Whether large or small, let us discuss your engineering problems and design programs.

For quick action see the nearest Scully-Jones representative or contact us direct.

RADIUS FORMING TOOLS



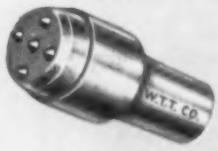
"TRU-LINE" PROFILE DRESSING TOOLS

IMPREGNATED DRESSING TOOLS

STANDARD DRESSING TOOLS

"TRU-THREAD" THREAD DRESSING TOOLS

INDUSTRIAL DIAMONDS



MULTI-DIAMOND TOOLS

"Sell it and make your fortune Mynheer Van Niekirk"

It was the year 1876. Free America was 100 years old and there were great celebrations in Philadelphia. In London, Queen Victoria was proclaimed Empress of India.

In South Africa, children playing by the Orange River found a bright pebble, too pretty to throw away, but when trader Van Niekirk offered to buy it they shouted with laughter and told him to sell it and make his fortune.

But, nobody wanted to buy the pebble so Van Niekirk dropped it in an envelope and mailed it to a government agent who declared it to be a diamond of 21 carats. Then, the governor of the Colony bought it for five hundred pounds and sent it to the Paris Exhibition as a curiosity.

Nobody paid much attention, but this was the first clue to the existence of the diamond fields that would one day pour out fabulous treasures in gems—and in industrial diamonds, those incomparable cutting points which do so much to increase production and reduce costs.

The diamond fields are but 75 years old, and for 43 of those years we have specialized in importing and selling industrial diamonds and manufacturing industrial diamond tools—engineered to your job and guaranteed to do it. Please write for our catalogs.

WHEEL TRUEING TOOL COMPANY

8-3200 West Davison Avenue • Detroit 6, Michigan

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Offices in Principal U. S. Cities—Agents Throughout the World

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WHEEL TRUEING TOOL COMPANY OF CANADA, LTD.
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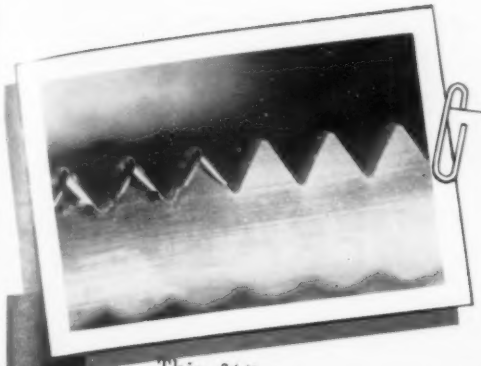


This 3/8" tap, magnified 30 times, has been partially deburred by Liquid Honing with 325-mesh abrasive.

Cut Finishing Costs

INCREASE LIFE AND SERVICE OF TOOLS WITH

Liquid Honing

SELF-CONTAINED UNIT, EASILY INSTALLED

Vapor Blast Liquid Honing is done in a self-contained cabinet. It is easily adaptable to automatic processing, with conveyors, turntables, and tumbling barrels. VB Machines are available in small tool-room models and larger, standard or custom-built to fit your requirements. Shown at right is Model 3030, Type B20, 30"x30" Liquid Honing Machine.

Liquid Honing is a method of blasting a fine abrasive solution at high velocity against the surface to be finished. It is applied rapidly and uniformly, regardless of the contour of the surface. Eliminating manual methods, it provides close and positive control over surface quality.

Manufacturers and other users of machine tools report greatly reduced finishing costs, increased tool life, improved tool performance and greatly simplified tool maintenance from the use of Vapor Blast Liquid Honing.

Feather burr removal after grinding, more efficient chip flow, better lubrication, reduction in stress concentration with less fatigue or chipping at the cutting edge — these are a few of the qualities found in Liquid Honed broaches, cutters, drills and taps.

For example, in a rough milling operation on cast iron gibs a manufacturer used a 20-tooth, high speed steel, 50° milling cutter. Depth of the cut averaged 1/8", width 1¼" and length 30". This cutter had averaged 17 pieces per grind, when run at a spindle speed of 61 r.p.m. with a feed of 5⅛" per minute. After the cutter was Liquid Honed, it was run at the same feed and speed. The output increased to 300 — an improvement of nearly 18 times.

BONDING SURFACE FOR PLATING

Because Liquid Honing produces a satin or matte finish, this means there is increased surface area for plating. The result is a firmer bond achieved with less plating material. Final centerless grinding on concentric parts is eliminated, and plating time greatly reduced.

LUBRICANT RETENTION

Break-in time required for plate-finished tools is greatly reduced with Liquid Honing. When honed after plating, oil no longer "beads" on the surface, but spreads immediately and thoroughly. Regrinding is not necessary, and tool can be used immediately.

VAPOR BLAST AND LIQUID HONING ARE TRADEMARKS.

FREE PROCESSING DEMONSTRATION

If you have a tool finishing problem, send us a sample to be processed for your evaluation. We'll return it to you with an accurate record of the processing data as a convincing example of the efficiency of the Vapor Blast Liquid Honing process.

VAPOR BLAST MFG. CO.

3025 W. ATKINSON AVE.
MILWAUKEE 16, WISCONSIN

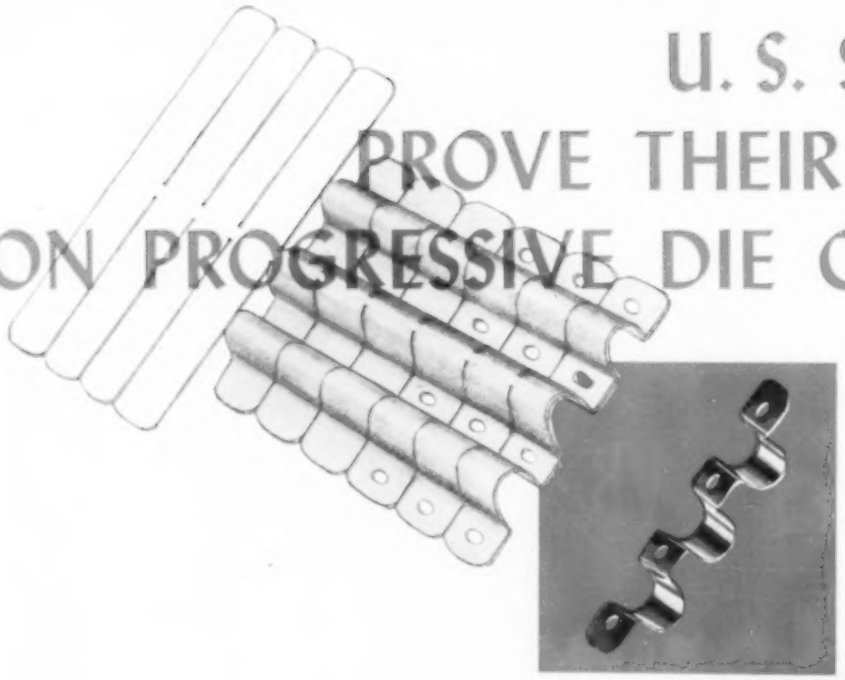
VAPOR BLAST MFG. CO.
3025 W. Atkinson Ave., Milwaukee 16, Wisconsin

☐ Under separate cover we are sending a part for a VB Liquid Honing demonstration. We understand there is no obligation. Letter enclosed.

☐ Please send us complete details on Vapor Blast Liquid Honing.

Our product is.....
Firm.....
Address.....
City..... State.....
Attention of.....

U. S. SLIDE FEEDS PROVE THEIR ACCURACY ON PROGRESSIVE DIE OPERATIONS

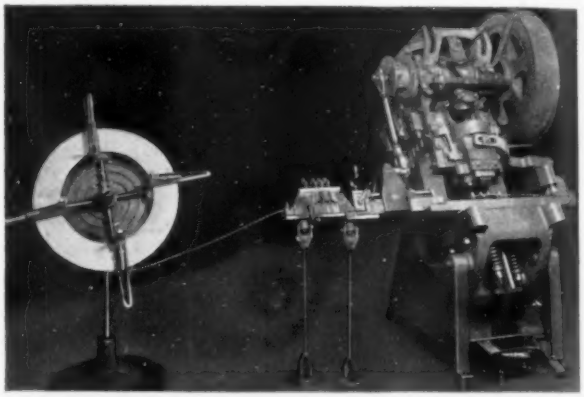


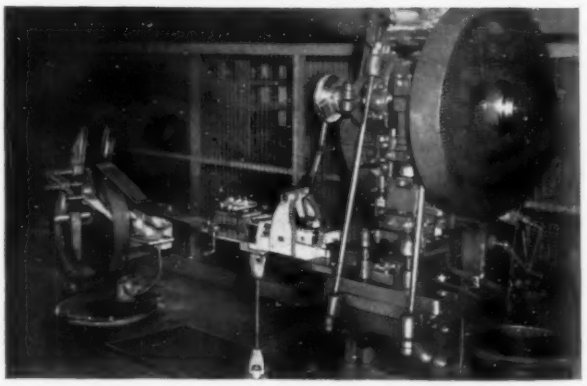
The photos at the right and below illustrate the use of U. S. Slide Feeds equipped with U. S. Plain Straighteners on standard type open-back presses. This setup converts the press into an automatic machine; all the operator has to do is to start a new coil of material into the die after the previous coil has been run off. To make the setup complete U. S. Stock Reels are employed in both instances for holding the coils of material.

Closely controlled accuracy with U. S. Slide Feeds —not just a statement, but a proven fact, as illustrated by the progressive die job being run by Judson & Rose, Inc., 3112 North 17th Street, Philadelphia 32, Pennsylvania.

The sketch on the facing page shows the progressive die operations, and the finished piece is shown actual size at the left. ***On this job there are no stops or pilots in the die. Accuracy of feed length is controlled by the U. S. Slide Feed to closer than .001".*** This example of U. S. Slide Feed accuracy is not exceptional. It is typical of results which are being obtained by other users of U. S. Slide Feeds.

If you have a press job which demands an accurate feed, we suggest that you investigate U. S. Slide Feeds. They are made in a range of sizes to accommodate stock up to 20" in width and with feed length adjustable up to a maximum of 20". Bulletin No. 80-T contains complete specifications of U. S. Stock Straighteners, U. S. Stock Reels and U. S. Coil Cradles. Ask for a copy.





US PRODUCTS

U. S. TOOL COMPANY, Inc.

AMPERE (East Orange) NEW JERSEY

Builders of U. S. Multi-Slides—U. S. Multi-Millers

U. S. Automatic Press Room Equipment—U. S. Die Sets and Accessories

FOR PRECISION

PLUS PRODUCTION . . .

PRECIS-O-NIZING

OLD mass production methods are not enough to satisfy a market that is demanding both *quality* and *lower prices*.

Only through modern precision-production techniques can a manufacturer hope to use this two-edged sword to his own advantage!

Because of this need for a productive method of generating precision . . . the Microhoning process was evolved. For a quarter of a century the Micromatic Hone Corporation, working with industry, has led the honing field in the development of equipment that would productively finish parts within the ever-shrinking tolerances of new designs and standards.

This applied precision-adeptness of the Microhoning process is "PRECIS-O-NIZING".

In one economical operation Microhoning abrades stock rapidly and efficiently with a minimum of heat to generate—

—bores that are round and straight
—accurate diametric size
—a functional characterized (cross-hatch pattern) surface finish that is free of smeared or distorted material.

The processing of sewing machine parts is an example of PRECIS-O-NIZING.

Shown are typical industrial sewing machine parts that are Microhoned. Total tolerance for size, roundness and straightness is held to .0002 inches, or less.

The shaft bushings (needle, presser, eccentric, hook . . .) are specific applications of functional Microhoning.

The characterized cross-hatch pattern and the precision of Microhoning enable these rotating and reciprocating bushings to retain minute reservoirs of lubricating oil. At the same time, they maintain such precise fit with their shafts that a working seal is formed and there is no leakage of oil.

Similar parts are interchangeable; selective fitting of components is no longer necessary.

Microhoning equipment is available to handle all kinds and sizes of parts . . . from soft non-ferrous metals to hardened steel and special alloys . . . from .078 to 60 inches in diameter and from ¼ inches to 75 feet in length.

MICROHONING = STOCK REMOVAL + GEOMETRY + SIZE CONTROL + SURFACE FINISH

PRECISION PRODUCTION THROUGH MICROHONING

MICRO MATIC

TRADE MARK

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March, 1953

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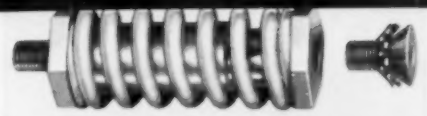

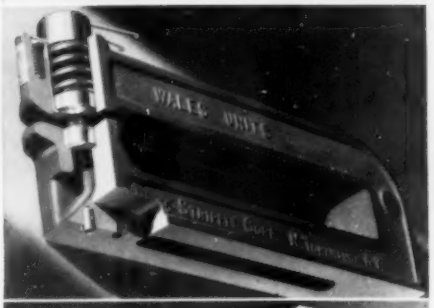

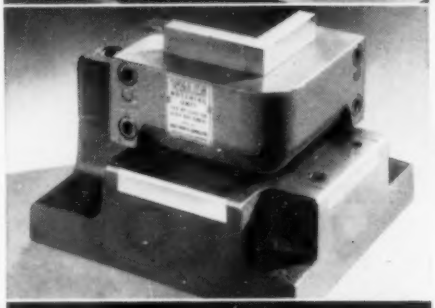

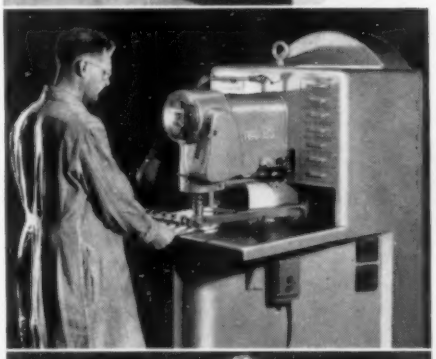

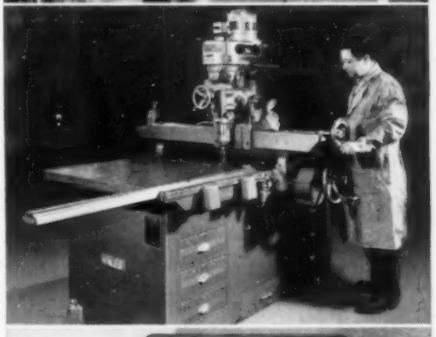

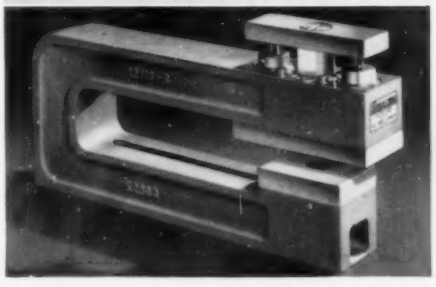

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